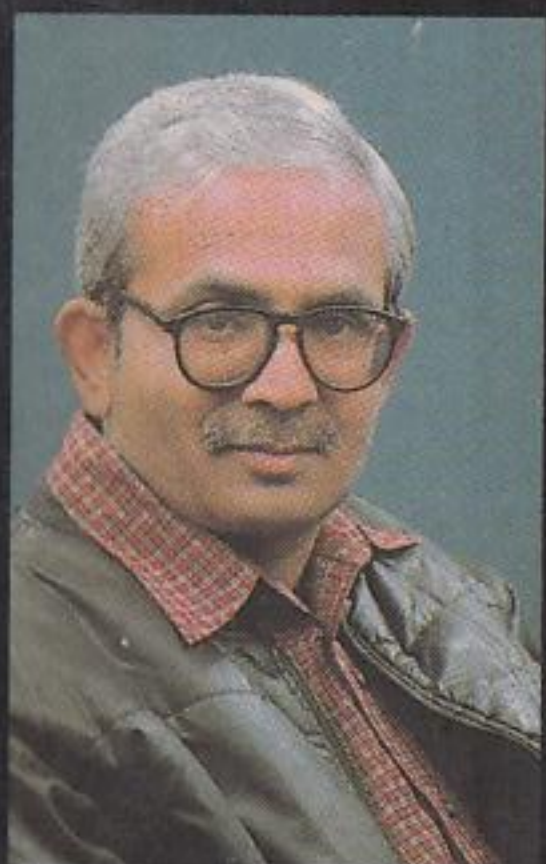


There are always curious stories, amusing anecdotes, and quaint characters in all subjects. More so in science, its practitioners known more for their absent-mindedness, eccentricities and even single-track madness.

Here is a collection of all those immortal and fascinating titbits that depict the human face of scientists who are otherwise renowned for their rationality, genius and contributions to mankind. It proves that there can be laughter even in science.



Dilip M. Salwi is a Delhi-based science writer. A winner of several national awards and fellowships for popularising science, he also writes science fiction and plays involving science and scientists. Author of about forty books, his *Scientists of India*, *The Robots are Coming*, *1000 Science Quiz*, *Story of Zero*, *Meet the Four Elements*, *Chemline Book of Quotable Science* and *Inventions That Made History* are bestsellers.

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FOLK TALES OF SCIENCE

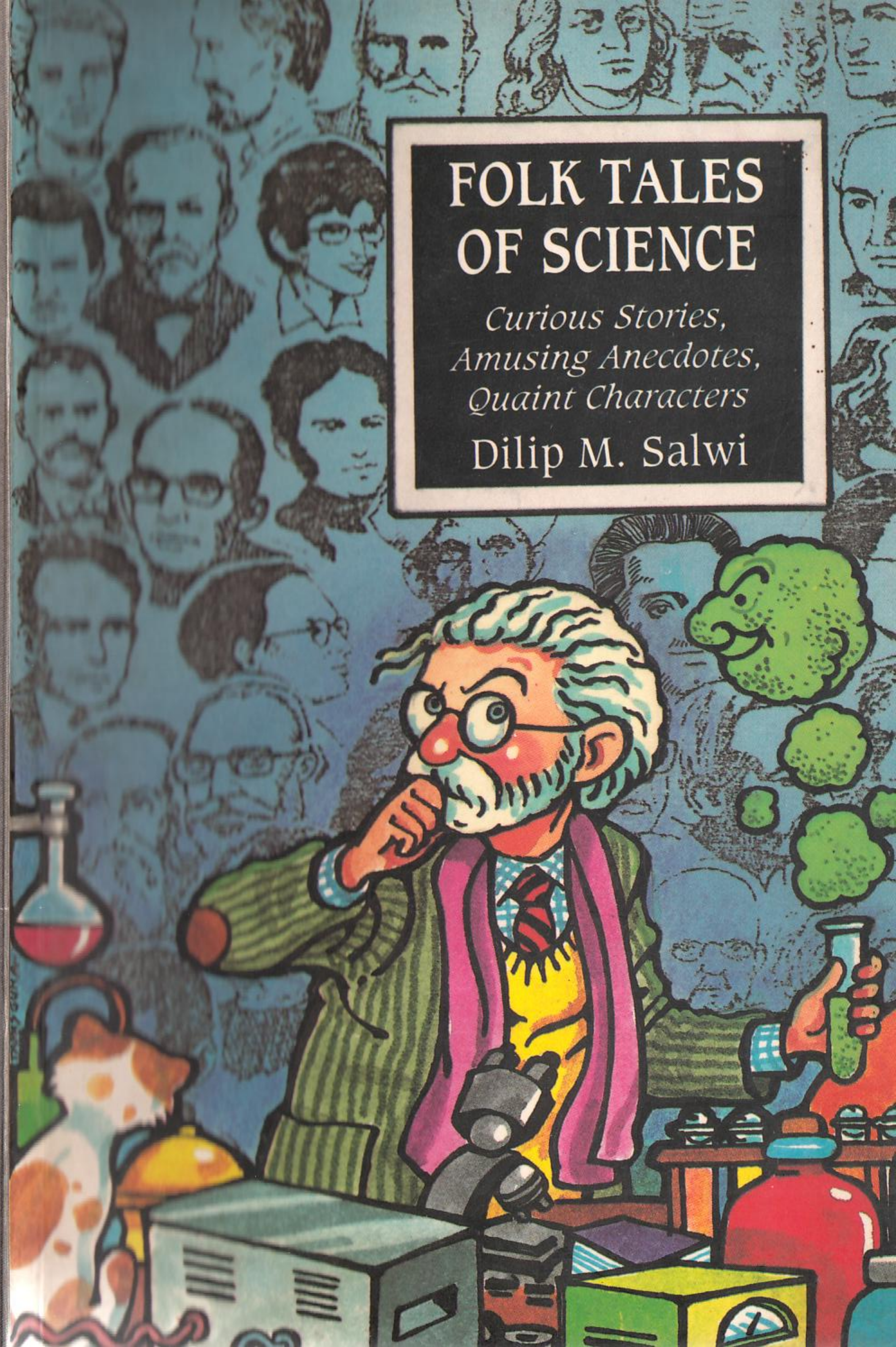
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## FOLK TALES OF SCIENCE

*Curious Stories,  
Amusing Anecdotes,  
Quaint Characters*

Dilip M. Salwi





*By the Same Author*

1000 Astronomy and Space Quiz

1000 Environment Quiz

1000 Science Quiz

1000 Maths Quiz

What is Science?

Scientists of India

The Robots are Coming

Story of Zero

Meet the Four Elements

Chemline Book of Quotable Science

Inventions that Made History

# Folk Tales of Science

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*Curious Stories, Amusing Anecdotes,  
Quaint Characters*

*For Dulari  
Happy reading!*  
Dilip M. Salwi *[Signature]* 18/4/01

*Cover & Inside Illustrations by  
Tapas Guha*

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To  
my friend and well-wisher  
Dr. Prasanna Kumar Panda



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## Preface

Science has always been considered as a serious subject and scientists very serious persons. But, are they not human beings, with their human frailties and foibles? I found that most science writers have not given importance to this aspect of scientists because it does not concern science. But I thought it to be a good vehicle to make people belonging to streams other than science somewhat familiar with science, its culture and practitioners. If, after going through this book, they remember some of these stories, anecdotes and characters with amusement, my purpose of increasing their exposure to scientists would be fulfilled. Next time, when they would come across something about scientists or science they would certainly pay attention to it, and not turn it down as something beyond their ken.

Of course, this book would also be an eye-opener to persons belonging to the science stream. Rarely, have they been acquainted with this side of science by their science teachers. I wish our school, college and university science teachers lap up the stories, anecdotes and



characters mentioned in this book and intersperse their science-loaded lectures with them. In this manner they would impart an element of human interest to their lessons or lectures, which is badly needed today to attract students towards the science stream. My purpose of writing this book, though from a non-science angle, would be more than fulfilled if it could hold students to science. A blank for the years of death of certain scientists had to be left in the book due to non-availability of information.

1 July 2000  
New Delhi

Dilip M. Salwi

## AGASSIZ, LOUIS

### *No Wastage of Time*

The Swiss-American naturalist **Louis Agassiz** (1807-1873) was such a popular figure in his home town of Neuchatel, Switzerland, that he was regularly invited to give lectures on geology. Once when he regretted his inability to give a popular science lecture, the organiser assured him that he would be paid for his lecture. In anger, Agassiz replied, 'That is no inducement to me. I cannot afford to waste my time in making money!'



## AMPERE, ANDRE MARIE

### *Happy — at Last!*

The health of the French physicist **Andre-Marie Ampere** (1775-1836), who conducted pioneering experiments in electricity and magnetism, deteriorated over the years. So sick he was of life that he chose the following epitaph for his own tomb stone: 'Happy — at last!'





## ARCHIMEDES

### *End of a Genius*

**I**t took several months of siege by the Romans before the Greek city of Syracuse succumbed, thanks to the marvellous military inventions of the Greek mathematical genius and inventor **Archimedes** (287-212 B.C.). The Roman soldiers sacked and looted it ruthlessly. However, the Roman General Marcellus had ordered his soldiers to arrest Archimedes and bring him to his court with respect.

The soldier sent to fetch Archimedes found the genius sitting on the beach, deep in thought, looking at some figures drawn on the sand. When he ordered Archimedes



to follow him to the court of General Marcellus, he merely shrugged his shoulders. The soldier went a step further to have a look at the figures drawn on sand but the latter gestured imperiously, 'Go! Go! Don't disturb my circles!' In anger, the soldier unsheathed his sword and killed Archimedes!



## ARKWRIGHT, RICHARD

### *The Inventor who could not Write!*

**B**ritish inventor **Richard Arkwright** (1732-1792), who invented the machine that could spin cotton and set the stage for a revolution in textile industry, could not write properly throughout his life!

He never went to school and as a child he worked in a barber's shop! As a person he was never liked because he was extremely arrogant and boastful.



## ATANASOFF, JOHN V.

### *First Electronic Computer*

**T**he American engineer **John V. Atanasoff** (1903- ) sketched out the basic principles of working of the world's first electronic computer over a drink in a



roadside hotel after a long aimless car drive! The computer was called ABC — Atanasoff-Berry Computer.



## **BABBAGE, CHARLES**

### *Fascinated by Spirits*

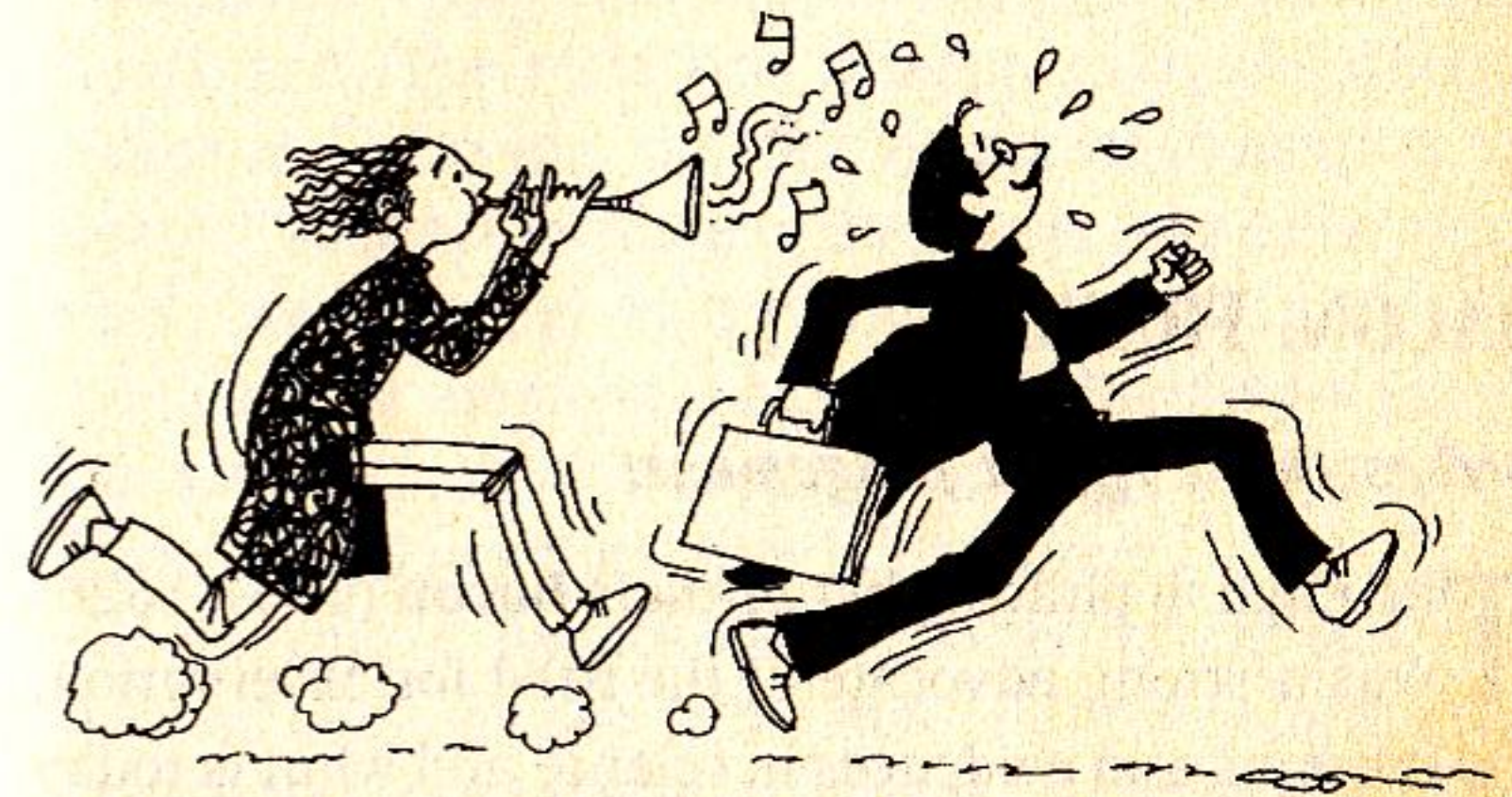
**T**he British computer pioneer **Charles Babbage** (1791-1871) was very precocious as a child. When he was hardly eight, living in a school hostel, ghosts and devils fascinated him. He was keen to meet and befriend them and therefore conducted a systematic study of their habits and time and places of appearance! Once he even visited an abandoned garret, drew a circle with his own blood and stood inside it, chanting mantras to invite them!

### *Mind Governs Body!*

**O**nce when young **Charles Babbage** was having a severe toothache, he stumbled upon a coin which looked like gold in his garden. Excited, he ran around the place, making enquiries about the coin, and eventually found it to be an old brass coin. In his excitement he had forgotten his toothache! Thus he realised that one forgets physical pain if the mind is filled with pleasure. Then onwards, whenever he had a toothache, he would read the exploits of Don Quixote or Robinson Crusoe!

## *Phobia for Musicians*

**I**n his old age, **Charles Babbage** developed a phobia for street musicians, particularly organ-grinders. Wherever he would see them he would shoo them away, claiming that they disturbed him in his work! His actions



made the musicians despise him. They would miss no chance to follow him in streets, jeering him and blowing their organs in his face and trouble him at any hour by blowing bugles and other instruments under his window!

### *All for an Invention!*

**W**hen **Charles Babbage** could not obtain money from the British Government for building his novel idea of an Analytical Engine, the blueprint of modern computer, a young, charming lady, Ada Lovelace,



inspired him to earn money for it by hook or crook! She felt that the concept of Analytical Engine was too important to be left untried. Babbage therefore tried his hands at all possible avenues — from betting on racing horses to writing pot-boiler novels — but all his efforts came to a nought! He died a disappointed man.



## **BACON, FRANCIS**

### *Bribes Don't Affect Judgement!*

**T**he English philosopher **Francis Bacon** (1561-1626) was a strong advocate of the need for observation, experiments and evidences in science and what is today known as 'Scientific Method'. He was once accused of taking bribes while he was the Viscount of St. Albans and sat on judgement over court cases!

Bacon, however, waved off the criticisms by claiming that the bribes never influenced his judgement! To top it all, he defended himself by claiming that his judgement had always gone against the bribe-giver!



## **BANACH, STEFAN**

### *Gem in the Garbage*

**O**ne day in 1916, Hugo Steinhaus, a young doctorate in mathematics, was walking in a park in Cracow, Poland, when he heard some snatches of conversation in which the mathematical term 'Lebesgue measure' was mentioned. The term was almost unknown outside France and even very few mathematicians knew what it meant. To his astonishment, Steinhaus found that those words were uttered by a young man, **Stefan Banach** (1892-1945), amongst the gossipers. Steinhaus helped Banach find a job of an assistant at the local engineering school and also guided him in his career.

In due course, Banach went on to become the superstar of Polish mathematics. In his short life of fifty-three years he founded the branch of higher mathematics called 'Functional Analysis', today known as the 'Lwow school of mathematics'.



## **BANTING, FREDERICK GRANT**

### *Sharing Money, if not the Honour!*

**T**he Canadian physiologist **Frederick G. Banting** (1891-1941) was to share the 1923 Nobel Prize for his discovery of insulin with John J.R. Macleod



(1876-1935). A professor at the University of Toronto, Macleod had simply given Banting some space in his laboratory unlike Charles H. Best (1899-1978), who had significantly contributed to the discovery! Banting became very furious. After much persuasion, he agreed to receive the prize, as he was the first Canadian to receive it. But he gave half the prize money to Best.



## **BARDEEN, JOHN**

### *Laurel & Hardy Fan!*

**A**s a nine-year-old boy, the American physicist **John Bardeen** (1908-1991), twice Nobel Prize winner for his contributions to the invention of the transistor and the theory of superconductivity, was very fond of the acrobatics of Laurel and Hardy, the British comedians. One day a neighbour asked his mother if she knew John was regularly hanging by his heels from a third floor windowsill!



## **BARNARD, EDWARD EMERSON**

### *Hoax on a Comet Seeker!*

**T**he self-made American astronomer **Edward Emerson Barnard** (1857-1923), renowned today for the discovery of double stars, was an avid comet hunter. On 8 March 1891, when he opened the issue of the daily *San Francisco Examiner* he was shocked to see a false news item about his own invention of an 'Automatic Comet Seeker'! The item claimed that he had invented an automatic device which could scan the skies by itself and discover comets on the basis of their chemical composition. The invention would make comet hunters redundant there onwards!

Puzzled, Barnard sent letters to *San Francisco Examiner* claiming that he had not invented such a device. But his letters of protest were never published. Only after two years did the daily publish an apology. Quite likely, some neighbouring Lick Observatory astronomers had given this 'authentic' news to the newspaper correspondent out of sheer jealousy or to perpetuate a hoax on Barnard!






## BARROW, ISAAC

### *Spare Child*


**T**he English mathematician and geometrician and Isaac Newton's teacher, **Isaac Barrow** (1630-1677) was a highly troublesome child. He was always fighting and used to promote fighting among other children! Such a thorn in the eye was he to his father that the latter would pray that if ever God decided to take any of his children, he would readily spare Isaac!



## BEG, ULUGH

### *Assassinated by Son!*


**U**lugh Beg (1393-1449), the Arab astronomer and prince, who set up an astronomical observatory in Samarkand, now Uzbekistan, and created a new catalogue of stars, was assassinated by his rebel son when he sent him into exile on the advice of an astrologer!



## BERNARD, CLAUDE

### *Scientist Who Wrote Plays*

**T**he French medical scientist **Claude Bernard** (1813-1878) had tried his hands at writing plays before he took to medicine and became a scientist. One of his plays *Arthur de Bretagne* was even staged in Paris!



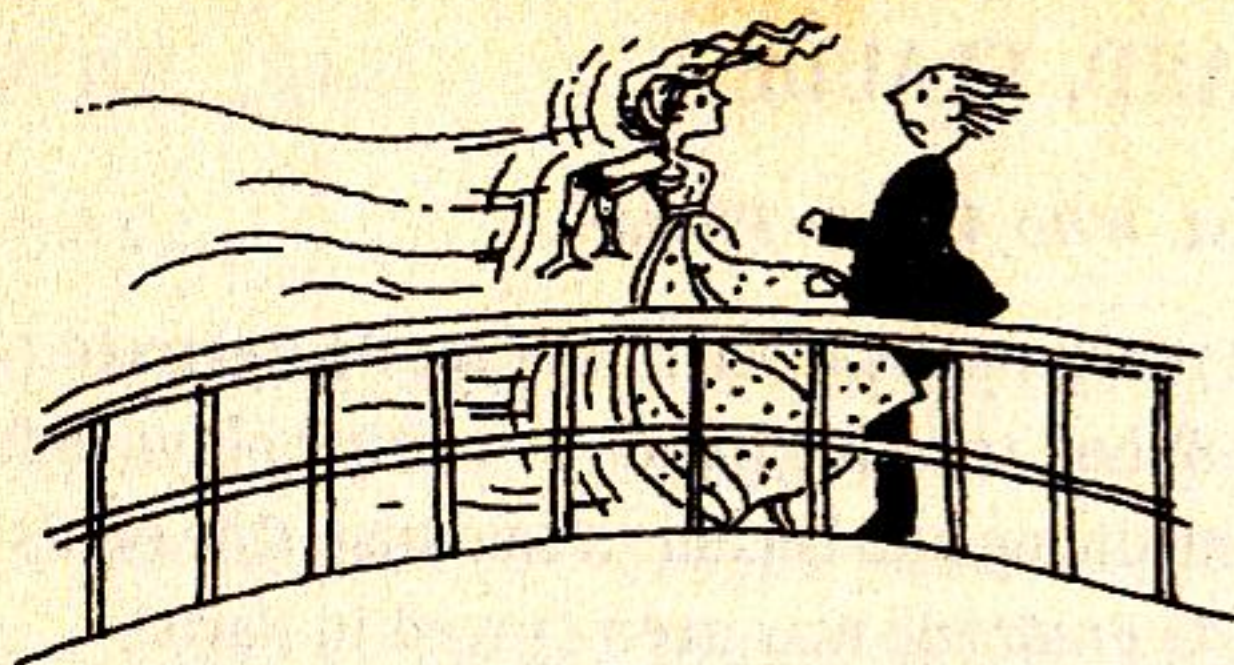
## BERTHELOT, PIERRE-EUGÉNE MARCELLIN

### *Marriage — Bollywood Style*

**T**he French chemist **Marcellin Berthelot** (1827-1907) married in a typical Bollywood style. Though they were family friends and met regularly, Berthelot never dared to look openly at the beautiful Sophie until an accident unified them.

On a cold chilly evening, when Sophie was crossing a bridge near Pont-Neuf in Paris, a strong blast of wind caught her off the guard, threw her dress in disarray, her hat flying into the water below, and pushed her straight into the arms of Berthelot! For the first time, Berthelot saw Sophie and fell in love with her! Their marriage took place on 10 May 1861.



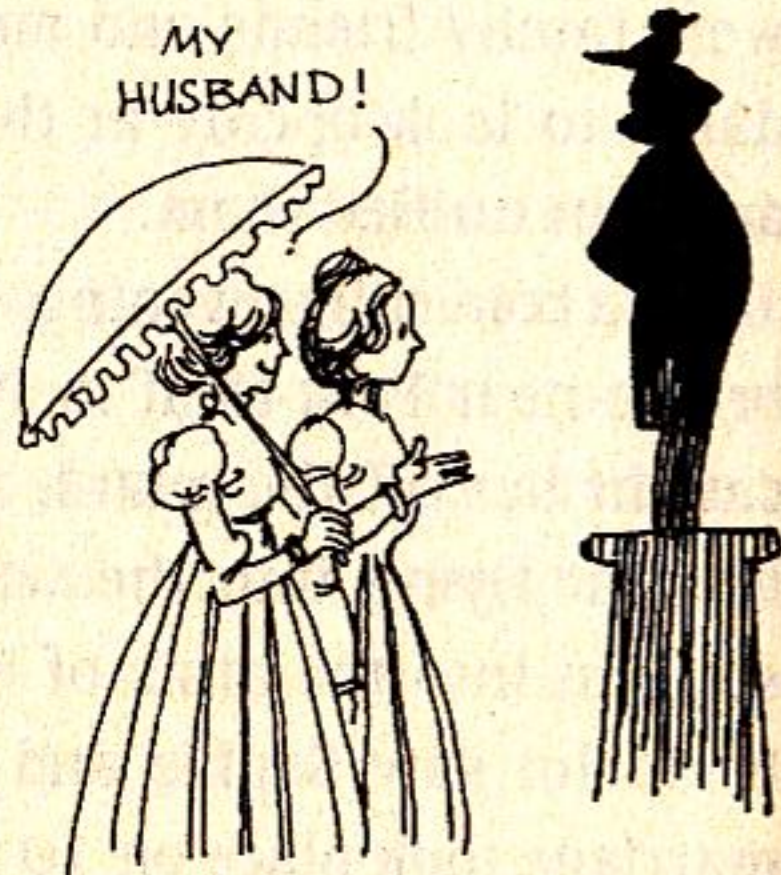


It is said that Berthelot was extremely fond of Sophie. He died a few moments after he came to know about Sophie's death!

## BERZELIUS, JONS JACOB

### *A Statue in a Park!*

The Swedish Jons Jacob Berzelius (1779-1848), one of the leading chemists of the time, had no time for domestic life. However, at the late age of fifty-six, he decided to marry — and he married a beautiful girl, Betty Poppius, thirty-two years younger than him! On the wedding day, the



reigning Swedish king Charles XIV bestowed Baronry upon him.

On a dinner party several years after the death of Berzelius, when somebody asked the young widow what her husband was, she replied, 'Oh, my husband? Well, he's a statue in Berzeli Park!'



## BHABHA, HOMI J.

### *Scientist with an Aesthetic Heart*

The founder of nuclear science in India and the man who created the Tata Institute of Fundamental Research and Bhabha Atomic Research Centre, Homi. J. Bhabha (1909-1966) was a violinist and painter too. Deeply interested in western and Indian classical music, he never missed an opportunity to attend a concert or orchestra, whether in India or Europe. Even when he was deeply involved in building research centres in India, he would listen to music before dinner and pursue his research hobbies late into the night.





Today, some of his paintings and sketches, which belong to the category of 'naturalism' in art, are present in British Art galleries. He ensured an aesthetic appeal to all the research centres that he built up. He bought paintings of some well-known Indian artists and displayed them in the corridors and halls of the research centres!

### *A Lover of Nature*

**H**omi J. Bhabha was a big lover of trees. Once, on his way to what is now called Bhabha Atomic Research Centre (BARC) at Trombay, he saw some persons chopping a rain tree on Pedder road, Mumbai. He stopped his car and enquired whether they had the requisite permission to cut the tree. The persons told him that they had bought the tree from the Municipal Corporation for the highest bid as it was to be removed because it fell on a road-widening line. Bhabha earnestly requested the persons to stop chopping the tree as he would find out a way to save it. When he reached the Centre, he told S.D. Vaidya, Head of the Landscape Architecture Division of BARC, to look into the case, transplant the tree and save it. Vaidya promptly visited the site and reported that as the tree was badly mutilated there was no point in buying it and transplanting it in

Trombay. This angered Bhabha who immediately asked, 'If you're a doctor, would you not save a patient who had third-degree burns which have disfigured his face?' He went on to add that scientists should not waste their time and talent in bothering about money. They should come forth with their best in the larger interests of the mankind, leaving monetary problems to administrators and financial wizards to take care of and solve!

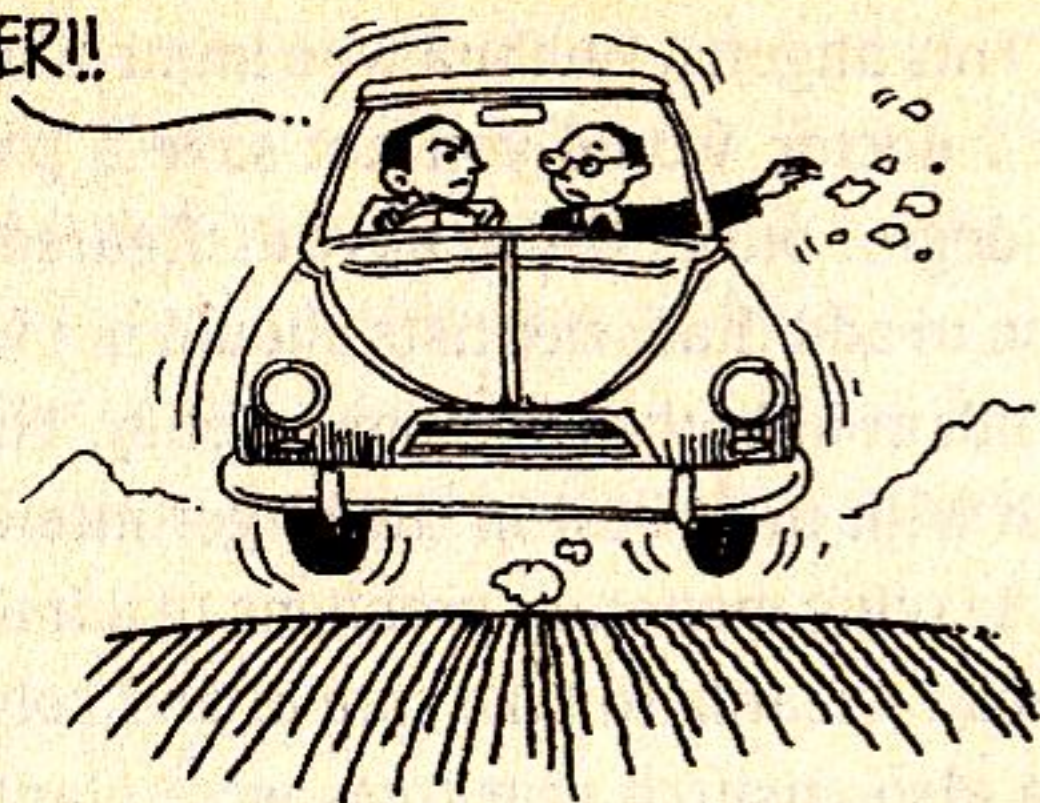
Bhabha also ensured that trees were planted on the hills surrounding the Centre much before its laboratories began to function. On other occasions, he transplanted trees to other places or had roads changed to accommodate an aging tree. He even complained to the then Prime Minister of India, Jawahar Lal Nehru, about the massacre of trees on Malabar Hill for a housing complex and had them saved!

Once, a highly confidential message for Bhabha from the Department of Atomic Energy, reached his Personal Assistant at Ooty. The latter wrote the message on a slip of paper, folded it and gave it to the young B.V. Sreekantan (1925- ), who was then doing research in cosmic rays, and asked him to pass it onto Bhabha.

In due course, Sreekantan joined Bhabha in his car on the way to the experiment site. Bhabha read the slip and passed it back to Sreekantan, saying, 'This is strictly



DON'T LITTER!!



confidential. Please make sure you destroy this slip!' Immediately, Sreekantan tore the slip into several bits and threw them out of the window of the car. In anger, Bhabha retorted, 'It's fine you destroyed the slip but you've cluttered the streets of Ooty!'



## BHASKARA

### *Arithmetics to Overcome Grief*

The six year old Leelavati, daughter of the great Indian mathematician **Bhaskara** (A.D. 1114), was excited because her wedding day was round the corner. She was particularly fascinated by the water clock that her

illustrious father had brought to mark the time of her marriage. An astrologer had told her father that her marriage had to be performed on a particular auspicious hour; otherwise, it might end up in tragedy.

Day in and day out, Leelavati watched with fascination the movement of the clock despite warnings by her father not to disturb it. One day a pearl from her earring fell into the water clock. She fled away in panic and did not tell this incident to any one! Due to the pearl the clock began to give inaccurate time. She was married off on the auspicious time as shown by the clock, and her husband died within a few months of the marriage!

Unaware of the wrong timing, Bhaskara felt he had made a mistake in calculating the exact auspicious time of the wedding and held himself responsible for the tragedy. Shortly, he began to teach Leelavati arithmetics so that she could overcome the grief.

Leelavati immediately picked up arithmetics. Impressed, Bhaskara even went on to dedicate his book on arithmetics to her. Today, his classic arithmetic book is known as *Leelavati*. In those days, it became such a popular book that people used to say: 'Whosoever is well-versed with *Leelavati* can tell the exact number of leaves on a tree.'





## BHATNAGAR, SHANTI SWARUP

### *The Poet in Scientist*

**T**he reputed Indian chemist **Shanti Swarup Bhatnagar** (1894-1955), who set up a chain of laboratories in India soon after her Independence, was a poet of repute. During his stay at Banaras Hindu University, he composed its 'Kulgeet' (University song)! In his college days, he wrote an Urdu play, 'Karamati' (Wonder Worker), which won the first prize in a competition in 1912!



### *Steamship Bhatnagar!*

**S**.S. Bhatnagar was a dynamic person and a 'live wire'. The eminent Indian physicist Meghnad Saha used to refer to him as 'Steam Ship Bhatnagar'!

## BOERHAAVE, HERMANN

### *Classic Lecture Notes*

**T**he eighteenth century Dutch chemist **Hermann Boerhaave** (1668-1738) was a very popular figure as a teacher of chemistry at the University of Leiden,

Holland. His students admired his lectures so much that they published his lecture notes without his knowledge in the form of a book *Institutions et Experimenta Chemiae* in 1724. Boerhaave was horrified to see the book because he felt it contained a lot of errors. He even publicly disowned the book. But, surprisingly, it became extremely popular and so he had no choice but to write an authorised version of the same — the two volume *Elementa Chemiae*, in 1732. This book, which went through about thirty editions, became one of the most influential textbooks on chemistry in the eighteenth century and laid the foundations of the chemical revolution that was to follow.



## BOHR, NIELS

### *Never Ashamed of Admitting Himself a Fool!*

**O**nce during his visit to the former U.S.S.R., the Danish physicist **Niels Bohr** (1885-1962), who was very popular among his students and who had created a first-rate school of theoretical physics at Copenhagen, was asked how he had succeeded in creating such a school, he replied, 'Probably because I have never been ashamed of admitting to my students that I'm a





fool!' The eminent Russian physicist E.M. Lifshitz of the Russian school of physics built by Lev Davidovich Landau thus translated this remark into Russian for the audience: 'Probably because I have never been ashamed of telling my students that they are fools!' When the audience laughed at this translation, Lifshitz realised his mistake and corrected himself. Later, one eminent Russian physicist and science populariser Peter Kapitza remarked that, the mistake in translation by Lifshitz was not accidental but deliberate because 'precisely herein lay the difference between Bohr's and Landau's schools!'

*It still works, even if you don't believe in it!*

**N**iels Bohr renowned for modelling the internal structure of an atom, never believed in superstitions and pseudo scientific beliefs. But one day when another physicist H.G.B. Casimir visited his country cottage he was surprised to see a horseshoe adorning its door. A horseshoe is believed to bring luck to its owner.



'What's this?' asked Casimir, pointing at the horseshoe, when he was about to leave Bohr, 'Do you believe in this nonsense?'

'No, no!' replied Bohr, shunning the subject, 'Who said I believe in this nonsense?'

'But, then, why have you....?' asked Casimir.

'Well, it still works, even if you don't believe in it!' replied Bohr, smiling.

### *Why Bohr is a Bad Speaker*

**N**iels Bohr was a bad public speaker. However his younger brother, Harald Bohr was an outstanding mathematician and an excellent lecturer of mathematics. On one occasion, when Harald was asked why this was so, he replied, 'Simply because each time in my lecture I speak only about those things which I have explained before, but Niels usually talks about things he means to explain later.'

### *Check on Greatness*

**T**he parents of the Dutch physicist H.G.B. Casimir were not keen to send him to study under **Niels Bohr** at Copenhagen. They wondered why their son was keen to do higher studies under a foreign professor in a foreign land. When Casimir told them that Bohr was not an ordinary physicist, and that he was world renowned for



his valuable contributions to physics, they were not ready to believe him!

In order to check on his story, Casimir's father sent him his first letter addressed thus: Casimir c/o Niels Bohr, Denmark. The letter was promptly delivered to Casimir, which convinced his parents of Bohr's fame.

### *Weeping over a Scientific Disagreement*

**N**iels Bohr visited India in the 1950s. During his lecture at Tata Institute of Fundamental Research, Mumbai, he talked at length about his own philosophical interpretation of quantum mechanics. He went on to add that his interpretation had, however, carried no weight on his good friend **Albert Einstein** (1879-1955), who had played a key role in the birth of quantum mechanics. Over the years, he had been trying his best to convince Einstein about the validity of his interpretation without success. His eyes became moist as he narrated the details of this scientific disagreement with Einstein. Eventually, he broke down and wept!

### *Einstein ... Einstein ... Einstein*

**N**iels Bohr was preparing to write on an argument about a physics problem he had with **Albert Einstein** when a young visitor entered his room. He suggested the visitor to take a seat and write down what

he had to say. Thus began his dictation. By sheer habit, he began to pace up and down the room and utter the words as they came to him. He began, 'Einstein ... Einstein ... Einstein ....'

When Bohr's back was facing the entrance and he was looking outside the window, Einstein quietly entered the room. He made a sign to the visitor to keep quiet and approached Bohr's drawer where he used to keep his tobacco. He was keen to steal some tobacco because his doctor had forbidden him to buy it. Meanwhile, Bohr continued the struggle with words without any progress, 'Einstein ... Einstein ... Einstein ....' And, then, he suddenly turned around to see Einstein about to open his drawer! For a moment, the two giant physicists faced each other, stunned. Then followed joy and laughter.

### *What do you Think about Spin?*

**I**n December 1925, **Niels Bohr** boarded a train for Leiden to attend the ceremonies held for commemorating the Golden Jubilee of H.A. Lorentz's doctorate. On the way, the train made a stop at Hamburg. On the platform were waiting the contemporary eminent physicists, Wolfgang Pauli (1900-1958) and Otto Stern (1888-1969).

Pauli asked Bohr, 'Prof. Bohr, what do you think about spin?'



In those days, a spinning electron was a new concept floated in nuclear physics to explain certain lines observed in the spectra of atoms. Bohr replied, 'Well, it is very very interesting.' Bohr always said so when he was not so sure about a concept but at the same time found it worthwhile.

When Bohr arrived at Leiden, the eminent physicists Albert Einstein and Paul Ehrenfest, who had come to receive him at the station, asked, 'Prof. Bohr, what do you think of spin?'

Bohr again replied, 'It is very very interesting but there is one problem....'

Ehrenfest said, 'Well, that has been solved by Einstein...'

Bohr said, 'Oh, well, then, it's fine!'

At the Leiden ceremony, Bohr met the two physicists, George Eugene Uhlenbeck (1900- ) and Samuel Abraham Goudsmit (1902-1978), who had propounded the concept of spin. He urged them to write a detailed paper on spin and also gave his approval.

From Leiden, Bohr went to Gottingen. At the platform he met two eminent physicists of the time, Werner Heisenberg (1901-1976) and Pascal Jordan, who again, asked him, 'Prof. Bohr, what do you think of spin?'

Bohr replied, 'Well, it explains many things. It is a great advance.'

Heisenberg said, 'Oh, yes, somebody else also says the same thing about it. But, I cannot recall who...'

On his return journey, when the train reached Berlin, Bohr was surprised to meet Pauli again at the station. He had made a special trip to Berlin to see him at the platform. He asked him what he thought about the spin after his meeting with other eminent physicists of the time.

Bohr reiterated, 'Well, it's a great advance!'

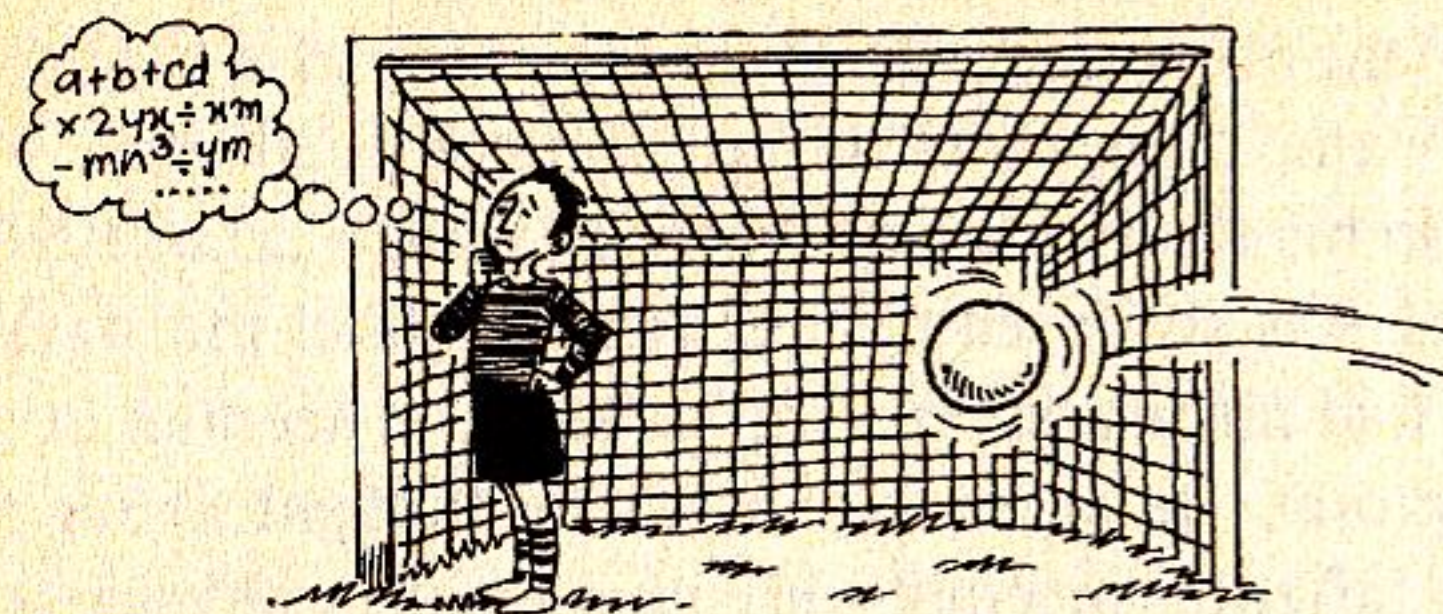
In his usual acerbic style Pauli immediately retorted, 'I hope it doesn't become another new Copenhagen heresy!' (Copenhagen is the name of a place where physicists once met and announced new ideas about modern physics)

After returning home, Bohr wrote to Ehrenfest that he had become a prophet of electron spin!

### *Maths in Soccer Court*

**N**iels Bohr used to play soccer for some clubs. On one occasion, when he was a goal keeper against a German club, the football remained more or less in the German side of the ground most of the time. And, when suddenly the ball came towards the Danish side, Bohr was found doing something on the goal post. It was only the clamour of the spectators that woke up Bohr from what he was doing on the post. He immediately rushed





to grab the ball and prevented a goal. Later, he admitted having forgotten the game as he had become busy solving some mathematical problem on the goalpost!



## BOLYAI, JANOS

### *Violinist and Duelist*

The Hungarian mathematician Janos Bolyai (1802-1860) was a skilful violinist and an excellent duelist. Once he crossed swords with thirteen duelists one after another, defeating all of them and playing violin between the duels!



## BONDI, HERMANN

### *Thanks to a Delayed Flight!*

As the Director of European Space Research Organisation, the eminent British astrophysicist Hermann Bondi (1919- ), renowned for his Steady State theory of the Universe, used to hop around Europe and the world so frequently that he used to do his office work while travelling! Once, waiting at a European airport for a delayed flight, he even wrote down a research paper!



## BOOLE, GEORGE

### *Teaching unto Death!*

The British mathematician George Boole (1815-1864) was very particular about his duties as a teacher. In November 1864, he walked more than four kilometres in cold rain to take a class and, in his sodden clothes, gave a lecture on higher mathematics. The result: he contracted pneumonia and died!

At the time of his death, Boole left behind a manuscript *The Laws of Thought on which are Founded the Mathematical Theories of Logic and Probabilities*. The



manuscript began: 'The design of the following treatise is to investigate the fundamental laws of those operations of the mind by which reasoning is performed...'

The mathematicians at the Royal Society, London, could not decipher its meaning. Boole's widow said, 'No mere mathematician can understand it, and no theologian cares to try!' Today, that manuscript has laid the foundation of what is now known as 'Boolean algebra' by means of which calculations are done electronically in a modern computer!



## BOSE, JAGADISH CHANDRA

### *Fighting Discrimination*

**D**uring the pre-Independence days in India, Indians were not considered fit enough to teach science. But in 1885 when the great Indian biophysicist J.C. Bose (1858-1937), returned to Calcutta after securing degrees from London and Cambridge, he was, after much deliberations, appointed as a professor in Presidency College, Calcutta, under the Imperial Service. However, to his utter surprise, he was paid only one-third



of what was paid to a European in the same post. Bose protested vehemently but to no avail.

Eventually, as a mark of protest, Bose decided not to accept any salary unless the disparity between an Indian and a European was removed, though he carried out his duties as a teacher religiously. It took the authorities three years to realise that Bose was a brilliant teacher and deserved full salary! Later, throughout his life, he fought for his rights against the Britishers, for his rights as a human being and as a scientist.



## BOSE, SATYENDRA NATH

### *The Physicist Addicted to Adda*

**T**he great Indian physicist S.N. Bose (1894-1974) loved gossiping for hours together. It is often alleged that he was addicted to what is known in Bengali as 'adda' — from small talk to serious discourse but without predetermined purpose or direction. Due to his gossipy nature, the great Indian chemist P.C. Ray considered Bose to be a prime example of a Bengali misusing his brain!





### ***When Things Cling Together***

**W**hen the British physicist P.A.M. Dirac landed at Dum Dum Airport, Calcutta, with his wife in the mid-1950s, S.N.Bose went to receive him.

On the way back to the university, Bose asked the guests to occupy the backseat of the car, and himself and the students accompanying him crammed into the front seat.

Dirac was surprised and asked, 'Are you all comfortable? Or would you....?'

Bose smiled and, looking back, said in his disarming style, 'We all believe in Bose Statistics!'

To the puzzled Mrs. Dirac, Dirac explained, 'In Bose Statistics, things crowd together!'

### ***Immortal Paper***

**B**ose had sent the significant paper containing his original idea of 'Bosons' — the elementary particles that follow the kind of statistics known as 'Bose Statistics' — first to an Indian research journal *Philosophical Magazine*! It was rejected. Bose, however, did not lose heart. On the advice of a friend, he sent it directly to Albert Einstein, the authority on the subject.

Einstein who considered it an 'important forward step', translated it himself into German, and submitted it to the German journal *Zeitschrift fur Physik* in 1924! That paper made Bose immortal in the history of science.

### ***On Einstein's Recommendations!***

**T**hough S.N.Bose had made immortal contributions to modern physics, he was not a Ph.D.! As a result, he had a tough time convincing the Dacca University authorities about his research capabilities. He had to take recommendation letters twice from no less a person than Albert Einstein, first to gain a two-year leave for study in Europe and, second time, for professorship at Dacca University!

### ***Not Cut Out for Research!***

**O**nce, Dr Ganesh Prasad, who had just joined Presidency College, Calcutta was criticising other teachers. S.N. Bose, who was listening to this, discouraged and rebuked Prasad. Thus the latter told Bose, 'You might score well in examinations but you are not cut out for research!'

### ***An Emotional Matter***

**D**uring his German visit in 1925, Bose had discussed various issues with Albert Einstein, including the Independence of India.

On one such visit, Einstein asked him, 'I think Englishmen are better than other Western colonial nations, and I feel that they are better than the French and Dutch.... Now tell me, *do* you really want that the British should quit your country?'



Taken aback, Bose replied, 'Of course, we all want to determine our own destinies ourselves!'

But Einstein, not convinced, raised a hypothetical question, 'Suppose there were a button near you and all the Englishmen would quit India if you were to press it. So, would you press that button?'

Bose smiled and said, 'If God were to grant me such an opportunity, I will not hesitate even for a moment to press it.'

Surprised, Einstein asked, 'Really?' and kept mum.

Bose then asked, 'Well, why do you Jews then want to establish a new Israeli State? Even you seem to be fairly inclined to its creation.'

Einstein smiled and said, 'Of course, I can now understand what you are saying. It is an emotional matter and cannot be understood rationally.'



## **BRAHE, TYCHO**

### *The Quarrelsome, Noseless Astronomer!*

**T**he famous Danish astronomer **Tycho Brahe** (1546-1601), renowned for his exact astronomical observations and his own astronomical observatory at the Island of Hven, was a quarrelsome person. During his youth he fought with a classmate and lost his nose



in a duel of swords. Since then he used to wear an artificial nose made of an alloy of copper to suit the colour of his skin! An aristocrat who had a big estate to govern, Tycho Brahe used to wear expensive clothes even when conducting astronomical observations because

in those days sky-watching was looked down upon as an inferior profession!



## **BRUNO, GIORDANO**

### *First Martyr of Science*

**T**he Italian philosopher **Giordano Bruno** (1548-1600) attracted huge crowds by his skilful and fiery speeches on the unconventional ideas of the time in science as well as religion. At various public platforms in Italy, England and France, he openly supported Nicolas Copernicus' theory that the sun is at the centre of the universe. The church could not digest what it thought was his 'anti-religious utterances', warned him against them, and when he still persisted, arrested him. A mock trial was held in which Bruno was proved guilty and put behind bars. Seven years later, he was burnt at the



stakes at a street crossing in Rome! It is said that he did not embrace the Christian cross offered to him even when he was in the throes of death! In history, Bruno is the first martyr of science!



## **BUSH, VANNEVAR**

### *Dreaming in a Definite Way*

**T**o dream in a definite way' was the motto of Vannevar Bush (1890-1974), the American engineer and inventor, who was the adviser on scientific issues to the U.S. President during the Second World War. Till his death he went on inventing things. Apart from pioneering the invention of the computer with his Differential Analyser, he invented a justifying typewriter, a rapid book selector, a silicone rubber valve for the heart and a bird-feeder. He also loved playing the flute and raising turkeys!



## **CANTOR, GEORG**

### *A Victim of His Own Teacher!*

**T**he German mathematician Georg Cantor (1845-1918) suffered nervous breakdowns throughout his life and eventually died in a mental hospital as his

contemporary mathematicians did not accept his ideas of infinity and transfinite numbers. The eminent French mathematician Henri Poincare (1854-1912) considered Cantor's idea of transfinite numbers as 'a disease from which mathematics will be cured' one day! Cantor's own teacher Leopold Kronecker, who had a hold over the contemporary mathematicians, considered him a 'scientific charlatan', 'renegade' and 'a corrupter of youth' and ensured that Cantor did not secure any teaching post and tried his best to stop his research papers from being published in journals!



## **CARDANO, GIROLAMO**

### *Proving Astrology Right!*

**T**he medieval Italian mathematician Girolamo Cardano (1501-1576) was a cheat, gambler and rascal and was given to murderous rages. He was sent to prison several times for some crime or the other. However, he had a firm faith in astrology too and even went on to draw the horoscope of Jesus Christ for which he was sent to prison. Using his mathematical acumen he drew his own horoscope and even the date of his



own death. But on the predicted day he found himself quite hale and hearty. He could not stand this and, in a murderous rage, he killed himself!



## CARVER, GEORGE WASHINGTON

### *A Rare Honour*

A national monument was built in 1953 at a plantation near Diamond Grove, Missouri, U.S.A., where the black American scientist **George Washington Carver** (1864-1943) was born — a rare honour for any scientist. Carver is renowned for developing a large variety of new products from plants. For instance, from peanuts alone, he developed three hundred types of synthetic materials, including dyes, soap, milk and cheese substitutes!

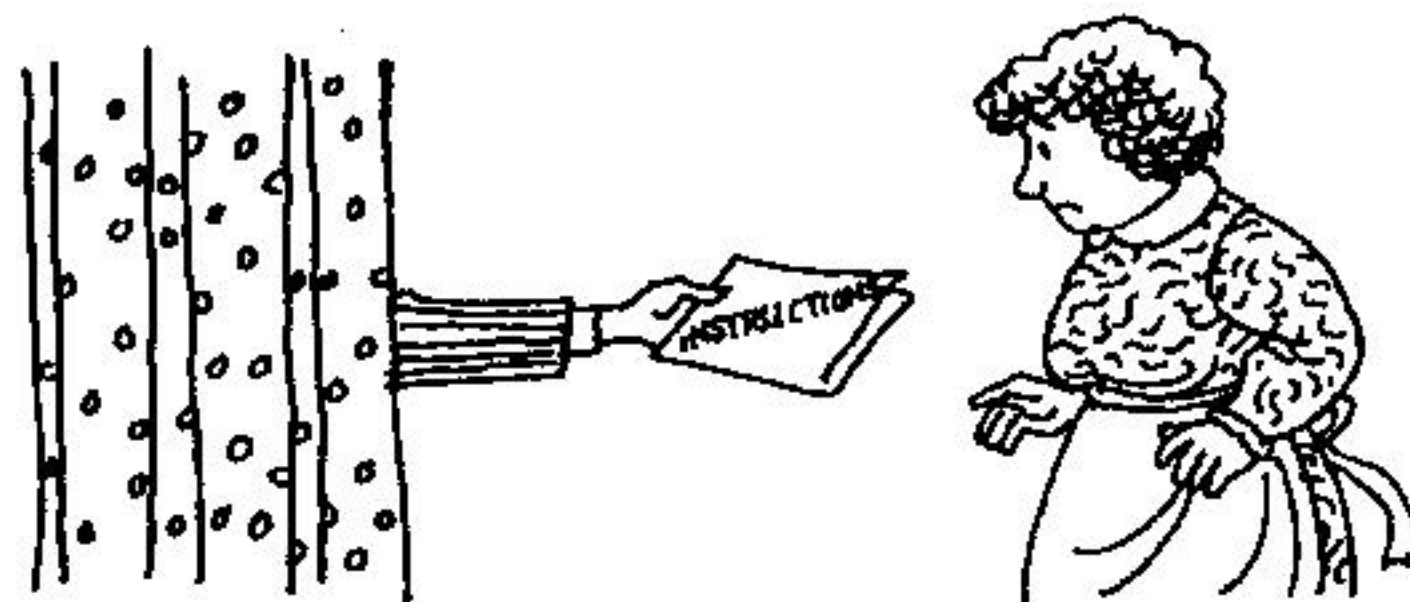


## CAVENDISH, HENRY

### *The Shy Scientist*

The British chemist-cum-physicist **Henry Cavendish** (1731-1810) was an extremely shy person. He would prefer to avoid a person and keep to his only

love — research. In fact, he would stutter if he had to speak to a person. He was scared of women and would try his best to avoid them. When it was difficult to avoid a house maid he would give instructions through written notes! Only once, it is said, he saved a woman from a



charging cow when he was on his solitary walk in the evening! Due to his shyness, he could not even obtain a basic degree in science because it involved appearing for a test and an interview!



## CHANDRASEKHAR, SUBRAHMANYAM

### *Ladyfingers Maketh Genius!*

During his school days in Madras (now Chennai), the eminent Indian astrophysicist **S. Chandrasekhar** (1910-1995) was not only a bright student who used to





score the highest in all tests and examinations but he was also a caring and affectionate boy. His classmates therefore never envied him, and called him a 'genius'.

Even his teachers were awed by his personality and brilliance. Once one of his teachers asked him what his favourite vegetable was. Chandrasekhar replied that it was ladyfingers. Then onwards, the teacher advised all boys to eat ladyfingers to become a genius!

### *Sportsman Spirit*

**S** Chandrasekhar was a sportsman too in school and college. Once, during an athletic meet in school, he participated in a race. While he was running, he heard a loud applause but he kept on running. As he ran, people kept on cheering him and he continued till he finished the final lap. At the finishing line he realised that the race had been over much earlier! Though he came last, he still received a medal for best sportmanship!



### *Acclaim Delayed, Not Denied!*

**S**ubrahmanyam Chandrasekhar was very excited when he was to present his latest findings on collapsing stars at the monthly meeting of the Royal Astronomical Society at London in 1935. For the first time, he had applied quantum physics to the internal structure of stars and had come forth with some novel findings. He was sure that his findings would be praised and appreciated by the attending astronomers and astrophysicists.

But to his surprise, he found that after his lecture the great British astrophysicist Arthur S. Eddington, whose word carried a lot of weight among astrophysicists, was to give a lecture on the very subject he was to discuss. During tea before the lectures, one astrophysicist asked Eddington what he was likely to speak further on Chandrasekhar's topic. 'That's a surprise for you,' said Eddington mischievously and walked away. Chandrasekhar gave his lecture and findings and claimed that a star having mass larger than that of a white dwarf could evolve into something as yet unexplored. In fact, he had then come close to predicting black holes! A star having mass larger than that of a white dwarf collapses into a black hole! When Eddington's turn came, he began to systematically tear down Chandrasekhar's mathematical arguments and his application of quantum



physics to astrophysical problems, cracked jokes at his findings, and went on to add, 'I think there should be a law of Nature to prevent a star from behaving in this absurd way.' There were loud peals of laughter in the audience.

Young Chandrasekhar was dumbfounded as that high priest of astrophysics had humiliated him publicly — without any advance notice!

Later, he showed his calculations and arguments to several eminent physicists such as Niels Bohr, Wolfgang Pauli, W.A. Fowler, etc. They found them flawless but did not say anything openly. It took him no time to realise that his prospects of getting a job in Cambridge were nil. He therefore decided to go to the United States, forget the controversy and clash but write a book on the subject all the same before he shifted to another subject.

When the book was published in 1937, it turned out to be a pioneering work in astrophysics! Chandrasekhar went on to win the Nobel Prize for his contributions to astrophysics in 1983.

### *Inimitable Style of Research*

**C**handrasekhar had an inimitable style of doing research. He would study a subject from scratch, make important research contributions to it for the next

decade or so, and then finally write a classic book on it before giving it up forever!

### *Uncle Not a Role Model!*

**T**he eminent Indian physicist and Nobel Laureate C.V. Raman was S. Chandrasekhar's uncle, but not his role model! In fact, Raman always urged Chandrasekhar to leave astrophysics, which he called the 'backwaters of science', and shift to nuclear physics! Chandrasekhar also politely rejected his uncle's invitation to join the Raman Research Institute as an assistant professor!

### *Inspired by Blue Waves*

**B**oth C.V. Raman, as well as S. Chandrasekhar stumbled upon their path-breaking works during their sea voyages to England. The deep blue of the sea inspired Raman to study the phenomenon of scattering of light. Chandrasekhar took up the study of white dwarfs to pass time during the long and dull voyage.

### *The Class that Won the Nobel!*

**I**n the mid-1940s, S. Chandrasekhar used to drive some hundred kilometres from Yerkes Observatory to the University of Chicago every week, whether it snowed or rained, to teach a class of two students! The mystery behind this special coaching cleared up when the entire



class won the Nobel Prize in physics in 1957! The two students were Tsung Dao Lee and Chin Lin Yang.

### *Pencil as a Gift?*

Once a sister-in-law of **Chandrasekhar** wanted to give him a gift and so asked him what would he like to have. He replied, 'Give me a pencil because that is the only thing I use!'



## COOK, JAMES

### *Eaten up by Cannibals!*

The world's first scientific explorer, the Britisher **James Cook** (1728-1779), who discovered several islands, observed a solar eclipse and transit of Venus and travelled as far as Antarctica, was killed in a scuffle with the natives of Hawaii Island and was quite likely eaten up too!



## COPERNICUS, NICOLAUS

### *Turning Hard Labour into Mockery!*

At the age of sixty-nine, when the Polish astronomer **Nicolaus Copernicus** (1473-1543) felt that his end was near, he decided to get his book *De Revolutionibus* (On the Revolution of the Heavenly Spheres) containing his revolutionary theory of the universe published. But as he was too old to handle its publication, he entrusted the job to his friend Tiedemann Gysius, the Bishop of Culm.

When the book was printed and a copy reached Copernicus he was on his death bed. He could only open his eyes and glance at it but was amazed to see a strange preface to the book which began thus: 'This book is written to present not a scientific fact but a playful fancy.' It was a terrible blow for him and he died a few days later thinking that his years of labour was turned into mockery. He did not know that the book would go on to create a revolution in science.



## COUSTEAU, JACQUES-YVES

### *The Aqua Man*

The French inventor of aqua lung, sea explorer, environmentalist and film-maker **Jacques-Yves Cousteau** (1910-1997) rarely stayed on land and was



always on the move in the high seas and oceans aboard his research ship *Calypso*. Through him the stories of sea adventures, the wonders of sea, and details of sea pollution and the urgent need for its conservation were brought to the drawing rooms of millions all over the world.



## CRAY, SEYMOUR

### *The Non-High-Tech Inventor*

Throughout his life, the American engineer **Seymour Cray** (1925- ), the inventor of the Super Computer, worked with a paper and pencil to draw plans for building his powerful number crunching machines — and never used any high tech computers for his work! He also did his work all by himself!



## CROMPTON, SAMUEL

### *The Unsociable Inventor*

The British inventor **Samuel Crompton** (1753-1827), who revolutionised the textile industry by building 'mule', a gadget for weaving yarns, avoided people and



was averse to publicity. Once he evaded a dinner given in his honour in Glasgow by quietly and surreptitiously leaving the city! On another occasion, he retired to bed, when an important person was announced at his home! He refused to meet him and threatened to crawl under the bed to hide from the visitor if he was brought to the room!



## CURIE, MARIE

### *Not Confined to a Lab*

**Marie Curie** (1867-1934), discoverer of radium and winner of two Nobel Prizes, was not an 'ivory tower scientist' simply confined to her lab. She rendered her services in public interest during the First World War. She drove ambulances carrying the newly discovered X-ray





apparatus to the war front for examining injured soldiers; supervised the installation of radiological rooms in hospitals and trained technicians in the science of X-ray diagnosis!

### *The Real Scientific Worker*

**W**hen Marie Curie's husband Pierre Curie (1859-1906) was killed in a road accident in 1906, the French University, Sorbonne, offered his professorship in physics to Madam Curie, breaking all precedents.

A hue and cry was raised by scientists against this appointment of a woman, made for the first time in the history of the university. It was claimed that Pierre was the real scientific worker and Madam Curie was merely his assistant!

### *Killed by Her Own Discovery!*

**M**arie Curie died on 4 July 1934 after a brief illness due to overexposure to harmful radiations emitted by radium — her own discovery! Her medical report claimed: 'The disease was an aplastic pernicious anaemia of rapid feverish development. The bone marrow did not react, probably because it had been injured by a long accumulation of radiations.'



## **DALTON, JOHN**

### *Miraculous Resemblance!*

**O**ne evening, one Mr Ransome visited the famous British scientist **John Dalton** (1766-1844). He found the latter sitting in a thoughtful mood, a cat on his knee, a newspaper at his elbow and a plaster cast at his side.

Mr Ransome immediately picked up the plaster cast and said, 'Oh, fine! I'm glad you have had this cast made of your features, Mr Dalton. Posterity will never cease to be grateful to you for being so thoughtful.'

'Oh, no, Mr Ransome,' replied Dalton, amused, 'It isn't my cast you're looking at...!'

'What?' exclaimed Mr Ransome.

'Yes, it's Sir Isaac Newton's!'

'Oh, what a striking resemblance, Mr Dalton!' exclaimed Mr Ransome, 'In fact, I would consider it a miraculous resemblance!'

'No, miracle at all,' replied Dalton with a smile, 'You see, Mr Ransome, it was the same mind that moulded the features for us both!'

### *Daltonism*

**J**ohn Dalton, who propounded the atomic theory of matter, was colour blind. That is why colour blindness is sometimes referred to as 'Daltonism'.



### Shunning Glory

**J**ohn Dalton had a such strong belief in Quaker religion which advocated shunning of glory that he refused the Fellowship of the Royal Society when Humphry Davy (1778-1829) nominated his name. More than a decade later, he was quietly elected as a Fellow, without his knowledge!



### DARWIN, CHARLES

#### *A Disgrace to Family!*

**D**uring his teenage and youth, the eminent British naturalist Charles Darwin (1809-1882), the propounder of the theory of Evolution of Life, spent much of his time in hunting and collecting birds and animals. As he belonged to a family of physicians, his father considered him a waster and once even said to him, 'You care for nothing but shooting, dogs, and rat-catching, and you will be a disgrace to yourself and all your family!'



#### *Descent From Apes!*

**W**hen Charles Darwin propounded his theory of evolution of life by natural selection through his book *The Origin of Life* in 1859, he raised a storm in the

conservative England of the Victorian times. Although in the eye of a storm, he remained unfazed and continued his relentless pursuit of collecting more evidences to support his theory. However, the science populariser and eminent biologist Thomas Henry Huxley, convinced by Darwin's theory, took the cudgels on his behalf. He even went on to call himself 'Darwin's bulldog'! In 1860, Huxley took the platform on the issue of the origin of man from the apes with a person no less than the Bishop, Samuel Wilberforce, before a huge gathering of scientists as well as public at a meeting of the British Association for the Advancement of Science, Oxford.

After much heated debate over the issue, amidst laughter, cheers and jeers, when Bishop Wilberforce was unable to clinch the issue scientifically, he asked almost in desperation, in his unctuous voice, 'Okay, Prof Huxley, finally, please tell me: Which side did you descend from the apes — father's or mother's?'

Huxley replied without flinching but with deep rancour, 'If I had to choose my ancestor, either a miserable ape or an educated person who would raise such a question in a scientific debate, I would choose the ape!'

Even the then British Prime Ministers, William Gladstone and Benjamin Disraeli, strongly opposed the ideas of Darwin. When Disraeli was asked, which side,



apes or angels, would he choose as ancestors of man, he replied, 'I'm on the side of angels!'

*Little Time Well Spent*

**C**harles Darwin was never in good health after returning home from his famous voyage to Galapagos Islands to propagate his theory of evolution of life.

Though he lived upto the age of seventy-three, he often complained of stomach and heart ailments. It is believed that he was infected by what is known as 'Chagas disease' when he was bitten by a bug of the Pampas, Southern America.

Though Darwin worked for only three to four hours a day, this little time was well spent every day in revolutionising man's ideas about his own origin and that of life in general!

*An Utterly Mischievous Book!*

**C**harles Darwin was terribly depressed till the end of his life by the way his now revolutionary book *The Origin of Species*, published in 1859, was received by the scientific community. Most scientists laughed at his idea that man originated from apes. The press drew cartoons that portrayed him as an ape! Even his own teacher called the idea 'utterly false and grievously mischievous'!



## **DA VINCI, LEONARDO**

*Sketches that Never Took Shape*

**T**he notebooks of the Italian inventor, artist and painter **Leonardo da Vinci** (1452-1519) are crammed with detailed sketches of all kinds of inventions from primitive battle tanks to flying machines to gears and gadgets. But, curious enough, except one invention none was converted into reality during his life-time! That only invention was the wheel-lock — the metal mechanism that supplies spark for igniting flammable compounds like gunpowder. In fact, Leonardo da Vinci died pleading with those around him, 'Tell me if anything was done at all!'



## **DAVY, HUMPHRY**

*Civil War of Worst Description!*

**W**hen wars were raging between England and France, the English chemist **Humphry Davy** (1778-1829) received a prize from the great French General Napoleon for his contributions to electricity. Davy happily received the prize and when somebody objected, he said, '... if two countries or governments are at war,



the men of science are not. That would indeed be a civil war of the worst description!

## DEDEKIND, RICHARD

### *Reading His Own Death!*

One day, while scanning through the mathematical calendar published in a journal, the German mathematician **Richard Dedekind** (1831-1916) was amused to find the announcement of his own death on 4 September 1899!

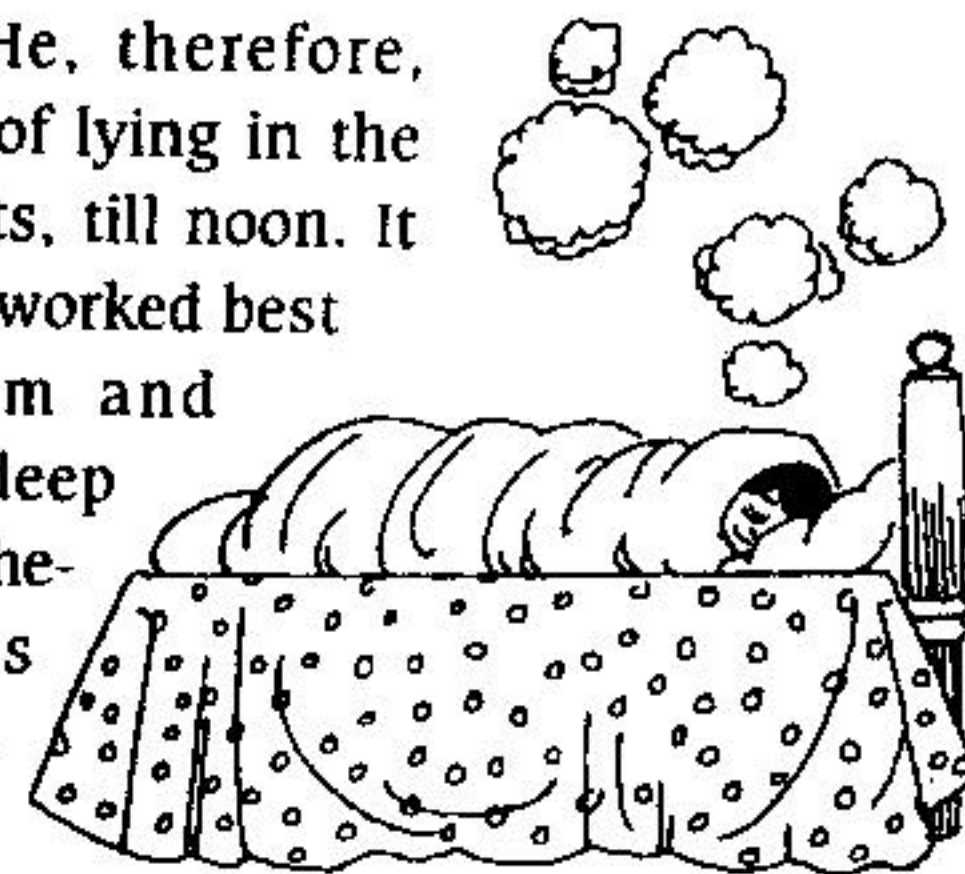
Promptly, Dedekind wrote to the editor: 'According to my own diary I passed this day in perfect health and enjoyed a very stimulating conversation on "system and theory" with my luncheon guest and honoured friend Georg Cantor of Halle.'

## DESCARTES, RENÉ

### *Fit When Horizontal and Warm*

The French philosopher and mathematician **René Descartes** (1596-1650) was fragile and weak since childhood. He would not feel fit enough to get up and

walk until noon! He, therefore, cultivated the habit of lying in the bed, covered in sheets, till noon. It is said that his mind worked best when he was warm and horizontal. All his deep philosophical and mathematical thinking was done in the pre-noon hours — in bed!



### *Death Due to Royal Request*

**D**escartes the originator of coordinate geometry, became seriously ill and died of respiratory problems when he started giving philosophy lessons to the Queen Christina of Sweden in her large, icy royal chamber at five o'clock every morning.



Descartes, who hated the cold weather and always woke up in the afternoon, essentially lived an isolated existence in a remote place in Holland and spent his time meditating, gardening and exchanging letters with contemporary scholars. But he was too polite to resist the request of the Queen to teach her. Nor did he make any effort to persuade her to



change the time or place even as he was feeling ill in the royal chamber!



## DHAR, NIL RATAN

### *The Nil Ratan Dhar Phenomenon!*

Today, Nil Ratan Dhar (1892-1986) is a little known Indian scientist but during his long life of more than ninety years he was considered to be the most dynamic scientist of pre-Independent India! An able teacher who never taught by syllabus, he lived frugally and saved money to set up fellowships and endowments for scientists, as in those days no money was available for research. He even went on to establish what is today known as Sheila Dhar Institute of Soil Sciences, named after his wife, at Allahabad. He was even nominated for the Nobel Peace Prize for his contributions to soil science!

After obtaining the D.Sc. degree from London University in 1917, he registered himself in what was then known as the Indian Educational Services (IES). Two years later, on his return from Paris, he went straight from the station to the British Board of Education office



at White Hall to make enquiries about his teaching appointment in India. In his buttoned-up coat and trousers, he would have appeared rather shabby, but as was his habit, he never cared for appearances.

A short statured Englishman came forward and said after consulting some papers, 'Yes, Dr. Dhar, your name has been registered for the IES two years ago, but what were you doing all this time?'

'... I went to Paris to study at Sorbonne,' replied Dhar.

'Oh! So, you were in Paris moving with pretty French girls — isn't it?' asked the Englishman.

'Well...' said Dhar, a bit taken aback, 'I studied in the Sorbonne Science Faculty and obtained the State Doctorate of Science...'

'But, how can you?' countered the Englishman, 'Foreigners are *not* given the State Doctorate of Science?'

Immediately, Dhar opened his bag and took out the certificate of the doctorate degree. The Englishman was surprised.

The next day, Dhar was informed that he had been appointed in the IES as a professor of chemistry. Subsequently, he was offered several choices of Indian universities to choose from. He opted for the professorship at the Allahabad University where he replaced an Englishman at the Chemistry Department. He was then hardly twenty-seven.





## DIRAC, PAUL ADRIEN MAURICE

### *Dirac's shyness*

**P**.A.M.Dirac (1902-1984), a British physicist, is renowned for his contributions to quantum physics. His book, *The Principles of Quantum Mechanics*, is considered to be the Bible of physics and is as important a landmark as Isaac Newton's *Principia*. A legendary figure during his own lifetime, his idiosyncracies, especially shyness and reserved temperament, were much talked about.

Once during a question and answer session after a lecture by Dirac, one person got up and asked, 'Sir, I didn't understand this and that in your arguments...'

Dirac did not stir and continued looking at the audience, as though nobody had asked any question. Then the chairman of the session asked, 'Prof. Dirac, would you be kind enough to answer this question?'

Dirac said, 'It was not a question. It was a statement!'

On another occasion, Dirac was living with a French physicist who knew little English in an apartment in the United States. One day when the physicist could not explain something in English, he asked him, 'Do you know French?'

'Yes, French is my mother tongue,' replied Dirac, who was half English and half French.

The Frenchman was annoyed. He burst out, 'And you are telling me now after having spoken to you in broken English for weeks! Why *didn't* you tell me this earlier?'

'You didn't ask me earlier,' replied Dirac.

Even his students had difficulties in talking to him. Often, he would answer in the affirmative or negative but his answer was always right.

Due to his reserved temperament, Dirac never built a school of thought. He had no following of students. He is renowned today only for his immortal book and research papers.

### *A Very Reserved Physicist*

**P**.A.M.Dirac once explained how he had become an extremely reserved person. His mother was English and father French. Once his father insisted on his talking to him only in French so that he would learn French. 'Since I found that I couldn't express myself in French,' said Dirac, 'it was better for me to stay silent than to speak in English. So I became very silent at that time — that started very early.' Moreover, his father did not appreciate the need for social contacts and encouraged him to pursue mathematics. 'The result was that I didn't speak to anybody unless spoken to .... I spent my time thinking about problems in nature.'

Once Dirac commented on Fyodor Dostoevsky's classic *Crime and Punishment*. He said, 'It is nice, but in one of



the chapters the author made a mistake. He describes the sun as rising twice on the same day!

### *When the Giants Met*

Once a student discovered a copy of E.M. Forster's *A Passage to India* in Dirac's room. He thought why not call for a meeting between Dirac and E.M. Forster, who was then teaching at the nearby King's College, and see what happens?

A meeting over tea was arranged. The two grand old men, one a literary genius and the other a science genius, came face to face. A heavy silence followed. After some time, Dirac asked, 'What happened in the cave?' (This is a crucial incident in the novel *A Passage to India* which sparks off violence between an Indian and the English community living in India.)

Forster replied, 'I don't know.'

Another spell of silence followed, at the end of which, the two giants parted company!

### *No Mysterious Sixth Sense*

The eminent Indian mathematician Harish Chandra (1923-1983) went to Cambridge, U.K., to study under the guidance of P.A.M. Dirac. He, however, found Dirac 'rather aloof and distant', though gentle and kind. Once he went to him with a physics problem and lamented that he found his proofs not rigorous enough. Dirac

replied, 'I'm not interested in proofs but only in what nature does!'

That remark put off Chandra. He wondered whether he did not have the 'mysterious sixth sense' required for doing research in physics. He therefore shifted to mathematics and went on to make important contributions to higher mathematics.



## **EDDINGTON, ARTHUR STANLEY**

### *Who's the Third?*

When Albert Einstein propounded his theory of relativity, very few persons in the world could understand it! After a discussion at the Royal Society office in London, a journalist approached the eminent British astrophysicist Arthur S. Eddington (1882-1944) and said, 'Well, Prof. Eddington, you must be one of the three people in the world who understands relativity.'

Eddington said, 'Oh, I don't know....'

The journalist said, 'Don't be modest, Prof. Eddington....'

Eddington replied, 'Oh, no! to the contrary, I am wondering who the third person is!'

### *Fascination for '137'*

The number 137, an experimental constant, is a 'magic numeral' which relates to the fine structure of hydrogen spectrum. It fascinated the British



astronomer and physicist **Arthur S. Eddington** so much that he always hung his hat on a peg of that number in the cloakroom!

## **EDISON, THOMAS ALVA**

### *Edison the Newsboy*

**B**efore the great American inventor **Thomas Alva Edison** (1847-1931) could establish a laboratory, he had to do several petty businesses to earn money in order to buy chemicals, books and equipment for his experiments. As a boy he used to sell newspapers and magazines, peddle candies and fruits, and even sell vegetables. Once he even set up his own newspaper *Weekly Herald*!



But the difference between any newsboy and Edison was that he always spent his spare time on reading good books in a public library!

### *In Gratitude*

**E**dison was taught the skills of telegraphy in return for saving Jimmie, the three-year-old son of his first employer, the station master at Mount Clemens, from death. The little boy had wandered off to the railway

tracks from an incoming train, without giving a thought to his own safety!

### *Edison's Notebooks*

**T**homas Alva Edison, who always kept a record of his work, went on to fill 3,500 notebooks during his life! They contain the details of step by step evolution of about one thousand of his patented inventions.

### *Food and Sleep in Snatches*

**E**dison used to eat and sleep in snatches in his otherwise extremely busy work schedule. He would sleep with a book as a pillow in his laboratory, surrounded with complicated gadgetry and instruments. He ate sparingly, taking snacks in small amounts from time to time as it was easy on his digestion!

### *Turning lab into prison!*

**T**homas Alva Edison once locked the doors of his lab to keep his workers from leaving it before they solved the problem he had assigned. Wives of some of the workers came to the barred doors of the lab pleading with Edison to release their husbands. They even tried to smuggle in food and drinks through a window. But Edison stuck to his guns. He did not relent until the problem was solved — and the job done!



### *The Missed Nobel Prize*

**T**homas Alva Edison, the inventor of the electric bulb and phonogram, would have been awarded the Nobel Prize for his innovative contributions jointly with Nikola Tesla, had the latter agreed. Tesla, who had a bad experience with Edison, did not want his name to be associated with Edison! The Nobel Prize was therefore awarded that year to a third, not so well-known inventor!



### **EHRlich, PAUL**

#### *Chemistry of Dreams!*

**T**he German chemist and father of chemotherapy, Paul Ehrlich (1854-1915) was an original scientific thinker from his childhood. Once during his school days when he was asked to write an essay on 'Life, a Dream', he wrote that, as life is an oxidation process, dreaming must also be a chemical process occurring in the brain, a sort of cerebral phosphorescence! His non-science teachers found this answer insufficient and gave him low marks!



### **EINSTEIN, ALBERT**

#### *A Very Smart Boy who Disliked Experiments*

**W**hen the famous physicist Albert Einstein (1879-1955) joined college at Zurich, Switzerland, he was initially very keen on experiments. But when his physics teacher H.F. Weber did not allow him to conduct an experiment on the earth's movement against the ether, he lost interest in experiments!

Weber also warned him, 'You're a smart boy, Einstein,



a very smart boy. But you have one great fault: you do not let yourself be told anything!' He also issued a strong warning in writing to him against neglecting experimental work. As a result, Einstein was rejected wherever he applied for the

job of a physics teacher which was already scarce in those days.

In the meanwhile, his father's business had suffered heavily and he had also got married. To make two ends meet, he therefore took up a job in a patent office at Bern in 1903, where he continued his first love — theoretical research in physics — during spare time.



*Averse to Bossing*

**A**s a student Einstein was sick of the authoritarian atmosphere and mindless teaching in the school gymnasium at Munich. From that tender age of fifteen he had developed a life-long aversion to authority. Once, one of his teachers remarked, 'Einstein, your mere presence spoils the class' respect for me!'

*In Love Letters too!*

**W**hen Albert Einstein fell in love with Mileva at the age of twenty, he used to write on contemporary physics problems in his love letters to her!

*'Music be the food of love'*

**A**lbert Einstein's second wife Elsa fell in love with him — not for his theories of relativity — but because he could play Mozart eloquently on violin! Music always helped Einstein to think and sort out his theories in physics. When he was deeply engaged in research, he would not talk to any one but would play the violin from time to time.

*Formula for Success*

**O**nce an American journalist in Berlin asked Albert Einstein 'What is the best formula for success, Dr. Einstein?'

'If A is success,' replied Einstein, 'I should say my formula is:  $A = X + Y + Z$ , where X is work and Y play ...'

'And what is Z?' asked the journalist impatiently. 'Keeping your mouth shut!' pat came the answer.

*Bath-Time Reverie*

**E**instein often took a bath before going to bed. Once, when he did not appear after an hour, his wife became anxious and entered the bathroom without knocking. To her surprise, she found Einstein lay soap-covered in the tub, deep in thought. Her entry broke his reverie and he said, 'Oh, well! I thought I was sitting at my desk!'

*Who's Mary Pickford?*

**O**nce, Einstein and his wife were invited to a theatre in the United States for the screening of a movie. Suddenly, the movie was stopped in the middle, lights came on in the theatre, and a pretty woman, a famous filmstar, walked down the aisle, approached Einstein and addressed him.

'My name is Mary Pickford. I'm sorry to disturb but I was very keen to shake hands with you....'

Einstein mumbled a polite reply. The filmstar left and the theatre turned dark again. Einstein turned to his wife and asked, 'Who is this Mary Pickford?'



*No Presents Please!*

**O**n his last and seventy-fifth birthday in 1954, the Emergency Civil Liberation Committee in the U.S.A. was keen to offer him a floral greeting. Einstein flatly denied the offer, saying, 'You may bring flowers to my door when the last witch-hunter is sentenced — but *not* before.'

When Einstein was offered the Presidentship of Israel, he was very agitated. He walked up and down the room, saying repeatedly, 'This is very awkward, very awkward....' Later, he called upon the Ambassador of Israel in Washington and made his position clear.

*Even my Chauffeur can Answer!*

**A**lbert Einstein was often called to give lectures to the public on his difficult-to-understand Theory of Relativity. His chauffeur who used to drive him to the lecture halls had heard his lectures so many times that he claimed to know it by heart. In a lighter vein, Einstein therefore suggested him to give the lecture the next time to which the chauffeur readily agreed.

In those days, very few people who called him for a lecture knew how he looked like. So, on the next lecture, Einstein and his chauffeur exchanged their roles. The chauffeur went to the stage to deliver the lecture while Einstein took a seat in the rear of the hall!

To the surprise of Einstein, the chauffeur did deliver his lecture on the Theory of Relativity ad verbatim. And when one person stood up and asked a question on the theory, the chauffeur replied, 'Oh, this question is so easy that even my chauffeur can answer it!' and he pointed at Einstein at the rear of the hall!

*Science is Exploring and Fun*

**O**n a visit to the Princeton University, a young student came across the familiar figure of none other than **Albert Einstein**. She was baffled to see the great scientist staring at a fountain and tilting his head this way and that way, striking curious postures, and sometimes moving his hands rapidly up and down.

But when Einstein saw her puzzled look, he asked her, 'Can you do it? Can you stop the stream enough to see individual droplets of water?' Then he showed her how to move her hands to synchronise them with the flow and create a strobe effect that freezes the droplets. As he left the fountain, he remarked, 'Never forget that science is just *this* kind of exploring and fun!'

*Happiest Thought*

**A**lbert Einstein's 'happiest thought' occurred when one day he was sitting on a chair in patent office at Bern in November 1907. That thought was: 'If a person falls freely he will not feel his own weight.' He was



startled. That simple thought enabled him to arrive at the Theory of Gravitation.

### *Relativity in Prison*

**I**n October 1916, Friedrich Adler, who was an old friend of **Albert Einstein** and a great admirer of the Theory of Relativity, walked into a hotel and shot Count Sturgkh, then Prime Minister of Denmark. When he was put behind bars, he wrote in 1917 a long thesis on relativity 'Local Time, System Time, Zone Time' and sent a copy to Einstein and other physicists for comment and advice.

Adler's family was keen that he should be declared mentally deranged on the basis of the thesis so that his heinous act could be forgiven by the authorities. His thesis was also sent to psychiatrists for examination. However, Adler felt that he had produced something remarkable which could not have been produced outside the prison.

Einstein and other physicists were therefore in a fix. They could not insult Adler's intellect by remarking that it was the work of a deranged mind. On the other hand, the question of his life or death depended on it. Einstein remarked that the work was based on 'very shaky foundations.'

Eventually, Adler was relieved after eighteen months in prison — perhaps the most lenient punishment in history for the assassination of a Prime Minister!



## **EULER, LEONHARD**

### *Phenomenal Memory*

**T**he Swiss mathematician **Leonhard Euler** (1707-1783) had a phenomenal memory. At the age of seventy, he could not only recite Virgil's *Aeneid* but also recall the first and last lines of every page of the books he had read as a young man!



## **EVANS, OLIVER**

### *Change of Title*

**T**he American inventor **Oliver Evans** (1755-1819), who pioneered steam navigation and industrial automation, wrote a guide called *The Young Steam Engineer's Guide* for operating and maintaining his steam boat or wagon. Just before its publication in the early 1800s, he changed the title to *The Abortion of the Young Steam Engineer's Guide* to express his frustration at the American Congress' rejection of the Bill to extend patent rights from fourteen to twenty-one years! He felt unhappy at this because it was only after a decade of patenting the steam boat that he could begin to earn substantial royalties!





## FABRE, JEAN HENRI

### *'Homer of Insects'*

The French scientist **Jean Henri Fabre** (1823-1915) wrote about ninety-five popular science books aimed at children and lay persons. During his lifetime, he had become very popular and he was even nominated for the Nobel Prize! His writings, especially those on insects — the ten volume *Entomological Memories* (*Souvenirs Entomologiques*) in French — were so much loved by one and all that the famous French writer Victor Hugo used to call him the 'Homer of Insects'.

A scientist who lived like a hermit in his own 'living entomological laboratory' in the countryside, Fabre was also an excellent painter of mushrooms.

At one time, Fabre also used to hold evening botany classes for girls. Once he was thrown out of his rented house by his spinster landladies when they learnt that he taught young girls the sexual functions of flowers! Today, his books on insects are more popular in Japan than even in France!



## FARADAY, MICHAEL

### *Science populariser par excellence*

The British physicist **Michael Faraday**, (1791-1867) well known for his laws of electromagnetism, was a



big populariser of science. In 1826, he began his now famous Friday evening lectures in the gatherings at the Royal Institute, London. Subsequently, he also began to give Christmas lectures for the young. His inspiring lectures were also supported with demonstrations. One of his popular lectures called

'Chemical History of Candle' is even today considered a classic in the art of science popularisation.



## FEYNMAN, RICHARD PHILLIPS

### *Having Fun*

**Richard P. Feynman** (1918-1988), great physicist and Professor of Physics at Cornell University, U.S.A., never visited the faculty club for food. Instead, he frequented the students' cafeteria where he could watch pretty girls of the university as he took snacks or meals!



One day while he was eating and watching so, he saw something curious happening in the cafeteria. A boy threw a plate into the air. The plate wobbled in the air as it flew down. The emblem of the university on the plate moved around but much faster than the wobble. That struck curious to Feynman who immediately took out some paper and began to make calculations on what he observed, and discovered a fine relationship between the wobbling of the plate and the rotatory motion of the emblem on the plate!



Later, when he showed his findings to his colleague, the eminent physicist Hans Bethe (1906-1999), the latter asked him, 'But, what's its importance?' Feynman replied, 'None at all. And I don't care if it has! All I wanted was fun — and I had it!'

### *A Vision Come True*

When even a single idea in science fiction comes true, its writer is hailed as a prophet. But what if a person's entire lecture comes true even before he dies. And, at that time when he gave that classic lecture, scientists in the audience were quite amused and thought he was trying to be funny.

That classic, visionary lecture called 'There's Plenty of Room at the Bottom', was delivered by **Richard P. Feynman** at the annual meeting of the American Physical Society on 29 December 1959. At that stage, electrical engineers were still struggling with fitting more than a few components on a chip; atoms were far beyond the ken of the most powerful of microscopes and microfilms were the best possible storage devices. But Feynman talked about etching lines the size of a few atoms, building circuits on the scale of angstroms and handling atoms to control the very properties of matter. Thanks to the emergence of nanotechnology today, his ideas have been turned into reality!

### *Physics is My Only Hobby*

**Richard Feynman** was a curious character. A person having contempt for authority and prizes, awards and honours, he always said, 'Physics is my only hobby; it is my work and entertainment.' When the Nobel Prize



was awarded to him in 1965, he did not deny it more due to the fear of the fuss it would create than its quiet acceptance!

Once the Indian physicist and science writer Jagdish Mehra asked as he interviewed Feynman regarding his classic book *The Beat of a Different Drum*, 'Do you feel a sense of power when you attack a new scientific problem?' Feynman said, 'No, I feel utterly dopey most of the time, but if it comes out all right, I feel happy. Each time it is a fresh experience of feeling stupid and finding joy and despair.'

### *Scientific Method to the Rescue!*

**R**ichard Feynman never bothered to remember dates and places, even of the conferences and seminars he was invited to give special lectures! He had the confidence that somehow he would reach the venue of a conference or seminar in time!

In 1957 Feynman was invited to give a lecture at a conference on 'Gravity' organised at the University of North Carolina. As usual he did not bother about the venue and time when he took the flight to Carolina.

When he landed at the airport and went for a taxi, the taxi-driver asked him, 'Where do you want to go?'

'University of North Carolina!' replied Feynman.

'Which one? The State University of North Carolina at Raleigh or the University of North Carolina at Chapel Hill?' asked the taxi-driver. This question foxed Feynman. He had never contemplated two universities with similar names!

'Where are the two?' asked Feynman. If they are near each other, he would first go to one and then the other.

'Well, one is south of this place. The other north. And both are equally distant!' The driver smiled.

Feynman looked around for a fellow passenger. But there was none.

What should he do? Try both universities? Suddenly, an idea struck him. Scientific method came to his rescue.

'Listen,' said Feynman, 'did you come across persons walking with their heads high in the air, talking to each other, not paying attention to anybody, saying things like "G-mu-nu! G-mu-nu!"?'

'Yes, yes, a whole lot of them!' replied the driver, his face lit up, 'All went to Chapel Hill!'

'Okay, then!' said Feynman with a smile, 'Take me to Chapel Hill....'

Feynman reached the conference on time to deliver his lecture.





**FINCH, GEORGE INGLE***Science and Hobbies*

**S**cience teachers often scorn hobbies because science students are then not able to devote fully to their studies. However, hobbies can make important contributions to science and make one immortal in that hobby. Such is the case of **George Ingle Finch** (1888-1970), a British chemist whose name today has become immortal in mountaineering — his hobby from the youth.

As a teenager and young man, Finch had climbed several small mountain peaks in Europe, especially in the Alps, Switzerland. In 1922, he went on an expedition to Mount Everest. His observations of the conditions atop the snowy mountains inspired him to introduce the light-weight windproof 'anorak' which replaced the heavy woollen jackets till then worn by mountaineers. He also advocated the use of oxygen, especially through the open circuit type of apparatus, for climbing, a suggestion looked upon with doubt when first proposed. Later, his oxygen equipment was used during the first successful ascent to the Mount Everest by Tenzing Norgay and Edmund Hillary of New Zealand in 1953!

**FISCHER, EMIL HERMANN***Too Stupid to be a Businessman!*

**T**he father of the German chemist **Emil Fischer** (1852-1919) was keen that his son should become a businessman to follow the family tradition. He even appointed a tutor to teach him business matters. But shortly, the tutor was disappointed and remarked that the boy would never amount to anything. Conceding defeat, Fischer's father declared, 'The boy is too stupid to be a businessman. It's better if he becomes a student!' He sent him for higher university education. Fischer went on to take up research in chemistry, did original work in organic chemistry, and won the 1902 Nobel Prize for chemistry!

**FITCH, JOHN***Invention of Steamboat*

**O**ne day in 1785, the American inventor **John Fitch** (1743-1798) was returning home after attending church. Although he 'never troubled churches much,' on that day the church trip troubled him. Suddenly, he had a rheumatic pain in the leg and he found it difficult



to walk. As he hobbled his way back home he saw a wealthy man passing by in a horse and buggy. Suddenly, it struck him if he could make a buggy run by the newly emerging steam power it would be wonderful. He went home and began to think over this wonderful idea.

But he soon realised that the roads in America were bad for such a vehicle. He therefore shifted his attention to building a boat that would run on steam power. Eventually, he went on to invent a steam boat!

### *An Inventor's Doggerel!*

**A**lthough inventors do not take to poetry that easily, **John Fitch** wrote the following lines summing up his life and frustrations.

*For full the scope of seven years  
Steam boats excited hopes & fears  
In me, but now I see it plain  
All further progress is in vain  
And am resolved to quit a scheming  
And be no longer of patents dreaming  
As for my partners Damn them all...*

He called the following lines 'Song of the Brown Jug' and enclosed them with his will:

*With my jug in one hand and my pipe in the other  
I'll drink on my neighbour and friend,*

*All my cares in a whiff of tobacco I'll smother,  
My life I know shortly must end.*

*I'll ne'er trouble myself with the cares of my nation,  
I've enough of my own to mind.  
All we see in this world is but grief and vexation,  
To Death I am shortly resigned.*

*So we'll laugh, drink, and smoke  
and leaving nothing to care  
And drop like a pair ripe and mellow,  
When cold in my coffin, I'll leave them to say  
'He's gone, what a true hearted fellow.'*



## **FLAMSTEED, JOHN**

### *Bonfire of his own Findings!*

**J**ohn Flamsteed (1646-1719), the British astronomer who built the now world-famous astronomical observatory at Greenwich and prepared the first modern star map using telescopes, was a perfectionist to the core. He never published his observations and findings unless he was absolutely sure. This was a cause of unhappiness to his contemporaries like Isaac Newton and Edmund Halley, who were keen to make use of his



valuable observations and findings in their own studies of the heavenly bodies.

Once, when despite considerable requests, Flamsteed did not publish his observations and findings, Halley got hold of them and published them in the form of a book. When Flamsteed learnt of this, he became furious and accused Halley of immorality. He managed to procure as many printed copies of the book as possible and made a big bonfire of them!



## FONTANA, NICCOLO

### *The Stammerer!*

The Italian mathematician **Niccolo Fontana** (1500-1557) became famous as Niccolo Tartaglia because he stammered and stuttered! In Italian language, 'Tartaglia' means 'stammerer'. He was not a born stammerer but became one when in his childhood a French soldier slashed at his face with a sabre in front of his mother in a cathedral during the sack of the town of Brescia! He received three wounds on his little head and two on his face. To hide his scarred monster-like face, Tartaglia used to sport a beard.



## FOREST, LEE DE

### *Fighting Patent Battles*

The American **Lee De Forest** (1873-1961), who invented the triode valve which kept the electronic revolution on the go until replaced by the transistor, spent a considerable amount of his money and time filing suits against people who had violated his patent rights, with indifferent results!

Once, at the peak of his career during 1912-13, De Forest was charged of fraud in giving an absurd and misleading statement to his potential investors. He had predicted that the human voice would some day be broadcast across the Atlantic. Somehow, the jury acknowledged his prediction, coming as it was from a leading physicist and inventor, and he was acquitted!



## FRANKLIN, BENJAMIN

### *The Lucky Experimenter!*

The American statesman and scientist **Benjamin Franklin** (1706-1790), who through his kite experiments showed that lightning is nothing but electric discharges, was a lucky experimenter. His kite



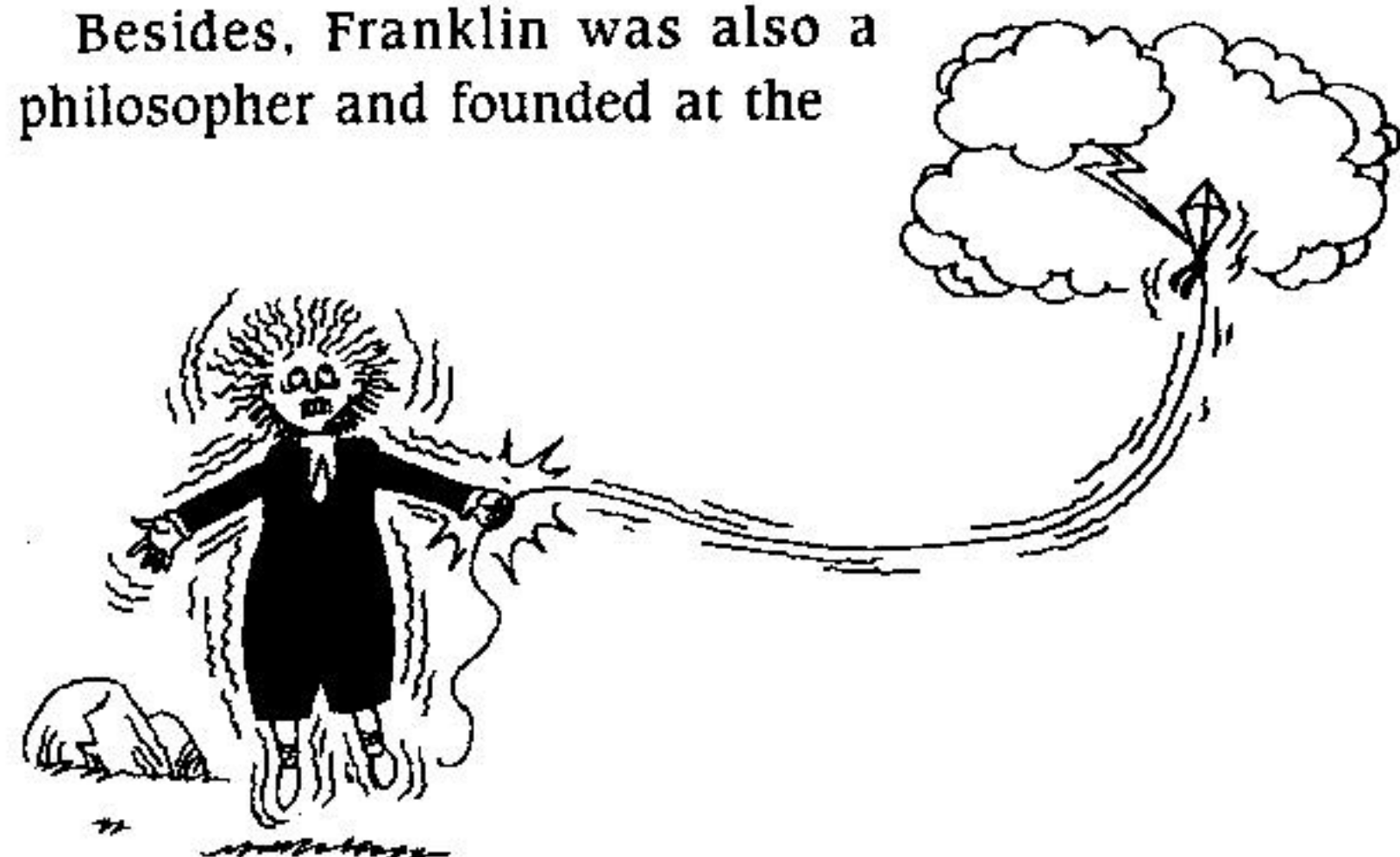


experiment could not be repeated because it killed the scientists who tried their hands at it! Although Franklin never repeated his experiment, his practical sense went on to create the lightning rod for the safety of buildings!

Franklin was also a journalist, editor and publisher. At the young age of twenty-seven, he started the *Pennsylvania Gazette*, a daily newspaper, and also the annual *Poor Richard's Almanac* in Philadelphia, U.S.A. The latter contained information on weather, sunrise, phases of the moon, seasons, holidays, etc. It also contained pithy sayings, some of which have become very popular today:

'God helps those who help themselves.' 'Early to bed and early to rise makes a man healthy, wealthy and wise.' 'Never leave till tomorrow that which you can do today.'

Besides, Franklin was also a philosopher and founded at the



young age of twenty-one, a group among young mechanics and tradesmen of Philadelphia to discuss various philosophical issues. The group grew to emerge as the first philosophical society in the United States, called American Philosophical Society.



## FRENKEL, YAKOV ILL'ICH

### *Scientific Explanation of the Curve*

Once, a colleague of the Russian theoretical physicist and a pioneer of science education in the former Soviet Union Yakov Ill'ich Frenkel (1894-1952) met him seeking explanation for a graphical curve, drawn on a sheet of paper. It was the result of his latest experiments. In sheer curiosity, Frenkel took the paper and began to give a scientific explanation to the experimental findings. Suddenly, his colleague realised his mistake and said, 'I beg your pardon. I showed the curve upside down!' He turned the paper upside down. Frenkel again looked at the reversed curve and began to give a scientific explanation for the same!





## FULLER, RICHARD BUCKMINSTER

### *Discovering the Operating Principles of the Universe*

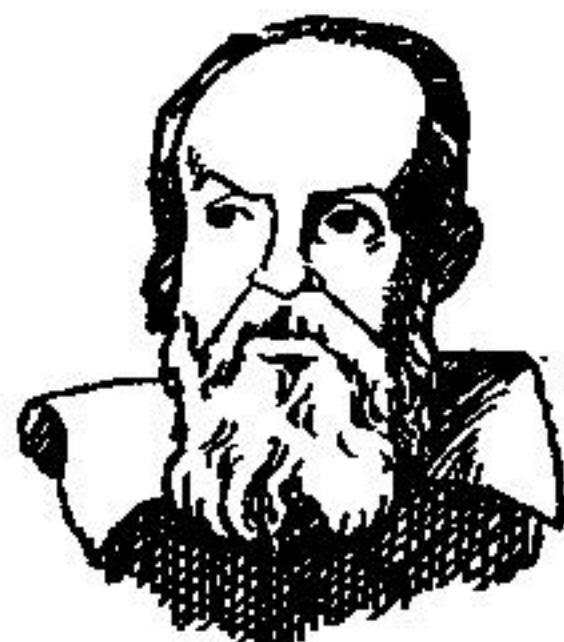
**A**t the age of thirty-two, R. Buckminster Fuller (1895-1983), the American engineer, mathematician and scientist, wanted to commit suicide. But then felt he had no right to eliminate himself and decided to give up money and success and spend his entire life to understanding the operating principles of the universe! The next two years he spent in total isolation and came forth with what is called 'Energetic-Synergetic' geometry for the human good! Today, he is popular for his invention of the 'geodesic dome' which is based on this geometry!



## GALILEI, GALILEO

### *Science Popularisation at its Best*

**T**he Italian mathematician and astronomer Galileo Galilei (1564-1642) wrote the book *Dialogue Concerning the Two Chief World Systems* in 1632. It was a commendable effort at science popularisation. The book was



essentially written to popularise the Copernican view of the universe which claimed the sun to be at the centre of the universe vis-a-vis the earlier view of Aristotle and Ptolemy that claimed the earth to be at the centre of the universe.

Like an adept science populariser, Galileo introduced the subject, the arguments and raging controversies about it through the dialogues among three Italian characters: Filippo Salviati, Giovanni Francesco Sagredo and Simplicio, of which the former two were his friends who were no more alive. In the ensuing dialogues in the book, Salviati supported the Copernican view, Simplicio the traditional views of Aristotle and Ptolemy, and Sagredo acted as what is today called an 'anchor' who stimulated and mediated the discussion between the two.

Simplicio, who makes a fool of himself throughout the conversation, represented no less a person than the Pope! Later, this error landed Galileo in serious problems.

### *And Yet It Does Move*

**G**alileo Galilei's *Dialogue Concerning the Two Chief World Systems* turned out to be a best seller when it was published in 1632! When the church authorities read the book, they became angry. However, by the time they reached the door of the publisher to seize the copies, all were sold out!



The Church banned the book but could not stop the readers as it was already in circulation. Thus, they began to harass Galileo in many ways. He was placed under 'Inquisition' — the trial of the Holy Office. He was repeatedly called to the church and was asked to clarify his stand on the motion of the earth.

Eventually, on 22 June 1633, in the Convent Sopra Minerva, seventy year old and near blind, Galileo knelt before a Church Tribunal and recanted all that he had stated about the the earth's motion and its position in the universe! However, there is a story that after recantation he immediately whispered, 'And yet it (earth) does move!'

Curious enough, 350 years later, Galileo's case was again opened in 1982 by Pope John II of Vatican and was examined in the light of fresh evidence regarding the earth and the sun. After ten years of examination, Galileo was freed of his anti-religious charges and declared a 'legitimate son of the Church'!



## GAMOW, GEORGE

### *Gamow-Hoyle Rivalry*

**T**he Russian physicist George Gamow, (1904-1968) known today more for his popular science books like *Mr Tompkins in Wonderland* and *One, Two, Three, ....*

*Infinity* than for his scientific work, was one of the founding fathers of what is today known as the 'Big Bang' theory of the universe. According to him, the universe was formed with a big explosion. During those days, the British astrophysicist Fred Hoyle had also propounded a rival theory called 'Steady State' theory of the universe which claimed that the universe had always remained the same, with the simultaneous creation and destruction of matter.

In those days, there was no strong evidence either to prove or disprove either of the theory. Gamow and Hoyle were therefore always at loggerheads and tried to belittle each other wherever possible. In his autobiography, Gamow wrote about the creation of the universe: 'It was so complicated that nowadays neither Hoyle, nor God, nor anybody else can figure out exactly how it was done!' On another occasion, when Gamow was having a drink in a bar, a group of young physicists, who knew about the rivalry between Gamow and Hoyle, bribed the waitress to go to him and say, 'Professor Hoyle, there's a telephone call for you!' Without missing a beat, Gamow responded, 'Hey, don't throw Hoyle on troubled waters!'

### *Beware! Danger Ahead!*

**I**n 1931, George Gamow wrote a textbook on nuclear physics, *Constitution of Atomic Nuclei and Radioactivity*, the first of its kind on the subject. He made a



special rubber stamp of the danger symbol 'skull and crossbones' and stamped it at the beginning and end of all passages containing anything to do with the new model of the nucleus as well as electrons!

When the publisher did not agree to print this symbol in the printed book, Gamow said, 'It has never been my intention to scare the poor readers more than the text itself will undoubtedly do!'

Finally, the symbol of a boldface sleepy S replaced the danger mark in the printed book!

### *Alpha, Beta, Gamma...*

**G**eorge Gamow purposely included the name of the nuclear physicist Hans Bethe in his research paper on the origin of chemical elements in the universe so that the authors of the paper should read like 'Alpher, Bethe, Gamow' (Ralph Alpher was his student) and sound like 'Alpha, Beta, Gamma' — the first three Greek alphabets appropriate for a paper on the origin of the universe!



## **GAUSS, CARL FRIEDRICH**

### *The Child Mathematician*

**W**hen the great German mathematician Carl Friedrich Gauss (1777-1855) was ten years old, his teacher once asked a difficult mathematical question

to keep the class busy for some time. The question was to sum up numbers from one to hundred. To the teacher's astonishment the young Gauss immediately raised his hand and gave the answer as 5,050. The teacher thought he must have got the answer from some senior student and had remembered it. But when he asked him how he had arrived at the correct answer, the young Gauss gave the formula  $S = n(n + 1)/2$ , where  $n$  stands for any whole number. Gauss gave the answer in less than a minute!

### *An Obedient Son*

**T**he German mathematician Carl Friedrich Gauss was the son of a gardener, canal tender and bricklayer, who had no appreciation for educational or intellectual accomplishments. But his mother Dorothea knew the importance of education and ensured that the young Gauss flowered into a mathematical genius. This obligation to his mother made him an obedient son till her death at the age of ninety-seven. When she became bedridden and lost sight, he would not allow any one else to attend to her!





## GELL-MANN, MURRAY

### *A Thunderous Entry*

The sky was cloudy, with intermittent flashes of lightning and peals of thunder. A student was about to open the door to get into the lecture hall at California Institute of Technology, U.S.A. when he saw his teacher, the American physicist and Nobel Laureate **Murray Gell-Mann** (1929- ), the propounder of the Quark theory of matter. With reverence he stepped aside to allow his teacher to enter the hall first when the latter said, 'No, wait!' and looked outside.

Then occurred a huge lightning flash. Gell-Mann shouted, 'Now! Let's go!' And as he opened the door and entered the lecture hall, a loud peal of thunder boomed!



## GEOPPART-MAYER, MARIA

### *Part-time Physicist*

**M**aria Goeppart-Mayer (1906-1972), the German-American physicist, who gave the Shell model of the atom and won the 1963 Nobel Prize, did part-time research in nuclear physics for thirty years before she

could secure a full-time appointment as professor of physics at University of California, San Diego, U.S.A.!



## GERMAIN, SOPHIE

### *Male Pen Name!*

**I**n all her correspondence with mathematicians and even her submissions to mathematical journals, the French mathematician **Sophie Germain** (1776-1831) used a male pen name, Monsieur LeBlanc, to avoid showing any one that she was a woman trying to make a mark in mathematics — an unheard of thing in those days!



## GILL, PIARA SINGH

### *A Formula for the Tan*

**O**ne day, on a weekend in the 1930s, when the Indian cosmic ray physicist **Piara Singh Gill** (1911- ) was sunbathing at Santa Monica beach, U.S.A., a lady and her five year old daughter passed by him. When the little girl saw the physicist, she shouted, 'Mummy! Mummy! Look at that man!'



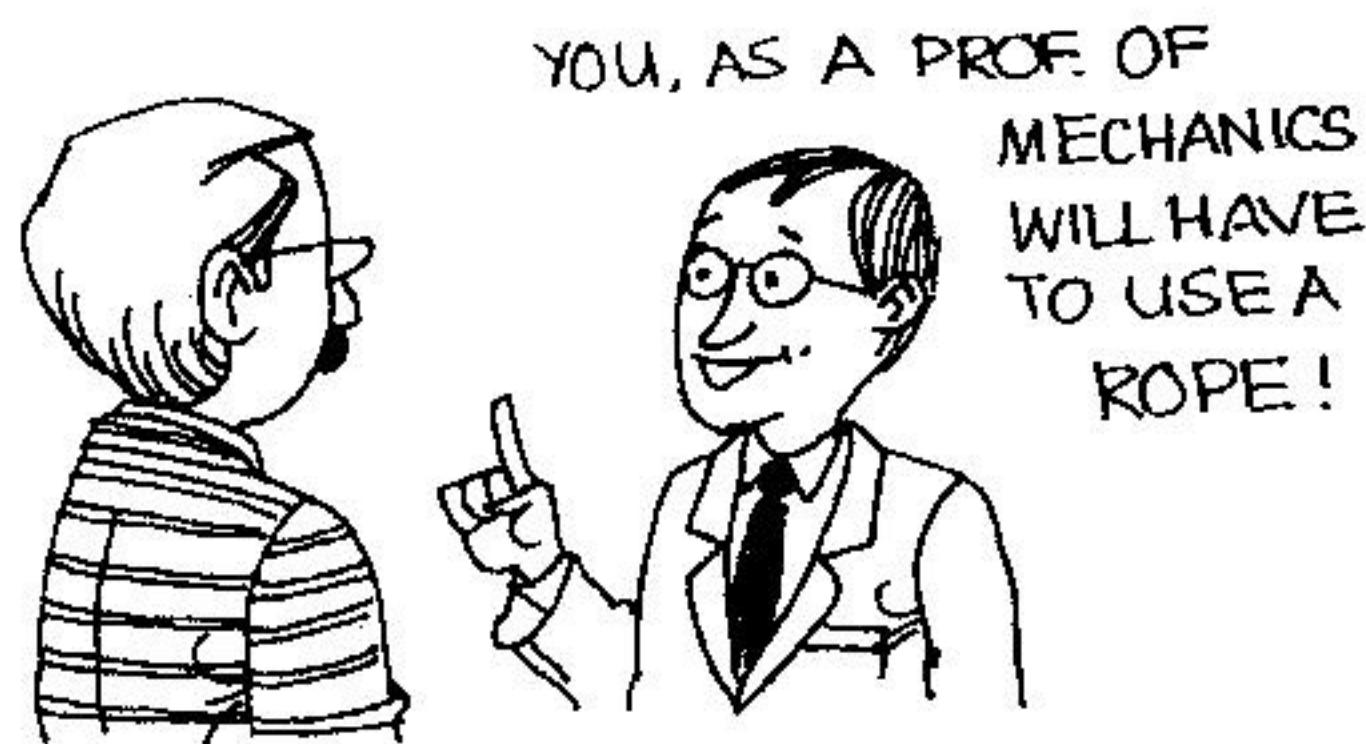
The lady stopped, looked at him and approached him. 'Excuse me, Sir, can you tell me the formula for the nice tan you have?' she asked. 'Very simple, Madam,' replied Gill, 'Five thousand years of Indian sun!'



## GOLDSCHMIDT, VICTOR MORITZ

### *Poison is for Chemists Only!*

**T**he Swiss-Norwegian geochemist **Victor Moritz Goldschmidt** (1888-1947), who did pioneering researches in the chemistry of minerals, was a Jew and hence under constant fear of harassment at the hands of the Nazi S.S. Guards during the Second World War. He therefore always carried a capsule of poison in his pocket. Once, when one of his university colleagues asked him



for the capsule, Goldschmidt said, 'This poison is for professors of chemistry only. You, as a professor of mechanics, will have to use a rope!'



## GOODYEAR, CHARLES

### *Passion for Rubber*

**I**f you meet a man who wears an India rubber cap, stock, vest and shoes, and has a money purse made of India rubber without a cent of money in it — that's Charles Goodyear! That is how people used to describe **Charles Goodyear** (1800-1860), the American inventor of what is known today as 'vulcanised rubber'. To produce rubber which does not become sticky in summer and hard like a rock in winter was his life-long passion.



## HALDANE, JOHN BURDON SANDERSON

### *The Guinea-Pig Scientist*

**T**he **John Burdon Sanderson** — or simply 'JBS' — **Haldane** (1892-1964), the England-born Indian biologist and a science populariser, conducted



experiments upon himself to test various ideas and theories. For instance, he drank hydrochloric acid,



common salt and calcium chloride solutions and inhaled the poisonous carbon monoxide and unbreathable carbon dioxide. He had acquired this habit from his father, John Scott Haldane a renowned physiologist of the times, who had even used young Haldane

as a guinea pig for many of his experiments! For instance, his father had used him in his experiments in hazardous locations like deep mines and underground atmospheres.

At the fag end of his life, Haldane had adopted Hinduism and used to wear a dhoti and kurta.

### *Celebrating Cancer!*

**J**.B.S. Haldane died of cancer. When he came to know that he was suffering from the terminal illness, he had no regrets. Rather, he enjoyed the experience, celebrated his cancerous status and wrote a poem on cancer!

He had thoroughly enjoyed his participation in the First World War also, and was hailed as the 'bravest and dirtiest officer' in the British Army. He had conducted many hazardous underwater experiments for the British Navy during the Second World War.



## **HALE, GEORGE ELLERY**

### *Suffering from Americanitis!*

**T**he American astronomer George Ellery Hale (1868-1938), who built several giant telescopes during his time, including the two hundred inch Hale Telescope known after him, suffered from several physical and nervous disorders throughout his life. He often suffered from violent headaches, insomnia, ringing ears, tingling feet and indigestion! He used to feel that his mind was getting out of control!

Hale referred to these varied symptoms as 'Americanitis' because he felt the Americans, due to their ambitious nature, had the tendency to drive themselves into insanity. Every morning, he used to jog for several kilometres up the steep incline of the Mount Wilson singing Italian poems. He also had the peculiar habit of holding his hands rigidly outward from the middle of his body and gazing into the distance for long durations.



A person with a powerful imagination, Hale felt that he was often haunted by the presence of an elf which offered him advice on matters scientific and astronomical. Did the elf urge him to build the giant telescopes that he eventually did?



## HARDY, GODFREY HAROLD

### *Child Atheist*

The British mathematician G.H. Hardy (1877-1947) was an atheist since childhood. Once on a foggy day, when he was walking with a priest, the latter likened God's grace to the pull of a kite. Due to the fog, the priest claimed, the kite was not seen. Young Hardy got confused, wondering, how the kite could fly in the fog when there was no wind!

### *In the Hobbs Class!*

G.H. Hardy was so fond of cricket that even in his mathematical research papers he would use cricket metaphors, which at times puzzled mathematicians! For instance, his highest praise for a mathematical proof was called 'in the Hobbs class' — not the philosopher Thomas Hobbes but the legendary Surrey cricketer Jack Hobbs!



## HAWKING, STEPHEN

### *The Incomparable Hawking*

The British physicist, cosmologist and author of the bestseller *A Brief History of Time*, Stephen Hawking (1942- ) is suffering from a rare and incurable,



disabling disease called 'Amyotrophic Lateral Sclerosis' or motor neuron disease. He was diagnosed to be suffering from this disease when he was hardly in his early twenties and doing Ph.D. at Cambridge University. The disease slowly degenerates nerves of the spinal cord and parts of the

brain. Initially, he could not tie his shoelaces, his speech became slurred, his legs gave in suddenly, and he kept bumping into things.

The chances of survival of such a person are small, leave alone his contributing anything to the benefit of the mankind. But by sheer will, determination and hard work, Hawking has since contributed enormously to our knowledge of black holes and the origin of our universe! Today, he moves, communicates and conducts researches on the mysteries of the universe by means of computerised machines specially designed for him!



### *Hazy Dots In the Black Sky?*

**W**hen the famous British physicist **Stephen Hawking** applied for a Ph.D. at Cambridge University, U.K., in 1962, there were only two areas in which he could conduct research: the study of very small — elementary particles — and the study of the very big — cosmology. He opted for elementary particles. Why? When he was an undergraduate student at Oxford he attended a course at the Royal Greenwich Observatory during vacations and saw the night sky through a telescope. He lost interest in observational astronomy when he saw some hazy dots filling the black sky!



## **HEAVISIDE, OLIVER**

### *A Worm*

**T**he British physicist **Oliver Heaviside** (1850-1925), who predicted the existence of ionosphere, was born in a slum and had no formal education. The only paid job he took up during his lifetime was that of a telegraph clerk. But he had a passion for learning and research. Day in and day out, he would shut himself up in his room, studying and immersed in mathematical calculations. Lack of education made him develop

unconventional methods to do calculations in physics which are used even today but were scorned at by his contemporaries!

When Heaviside was elected a Fellow of the prestigious Royal Society of London, his neighbours, unable to understand its importance or meaning, took it as a big joke! Actually, they used to consider him a worm — a big, capital WORM — as he used to always live bedraggled and unkempt! The only thing he paid attention to were his nails! They were always properly manicured and painted cherry red!



## **HELMONT, JAN BAPTIST VAN**

### *House Arrest till Death*

**J**an Baptist Van Helmont (1579-1644), the Medieval Flemish physician and alchemist better known as the Father of Biochemistry, came into trouble with the church authorities when he made comments on the medicinal value of Saints' bones. He was first imprisoned and then kept under house arrest during the last ten years of his life!





## HERSCHEL, WILLIAM

### *From Music to Science*

**W**illiam Herschel (1738-1822), the German-British astronomer renowned today for the discovery of Uranus, was essentially a musician. Before he turned his eyes towards the night sky through the newly invented telescopes, he was famous as an organist and a music teacher. In fact, it was his interest in the theory of music that turned his attention first to mathematics, then to optics and finally to astronomy!



## HILBERT, DAVID

### *President of Women Students!*

**I**n those days before the First World War in Germany, a woman in science or mathematics was looked upon as a curiosity! Emmy Noether (1882-1935), who started a new school of thought in mathematics and is today considered as one of the greatest mathematicians of the twentieth century, always faced stiff opposition to her entry into the faculty of mathematics of any German university. However, some brilliant mathematicians of the time who saw through her genius always fought



tooth and nail for her entry into a faculty position. One such contemporary mathematician was David Hilbert (1862-1943). During a university meeting when all members opposed Emmy's entry into a faculty position, he said with biting sarcasm: '*Meine Herren*, I do not see that the sex of the candidate is an argument against her admission. After all, the senate is not a public bathhouse!'

Hilbert had become so famous as a supporter of women's right to education that he had become the butt of all kinds of jokes. On his fiftieth birthday he was awarded the lifetime presidency of a fictitious organisation, 'Union of Women Students'!



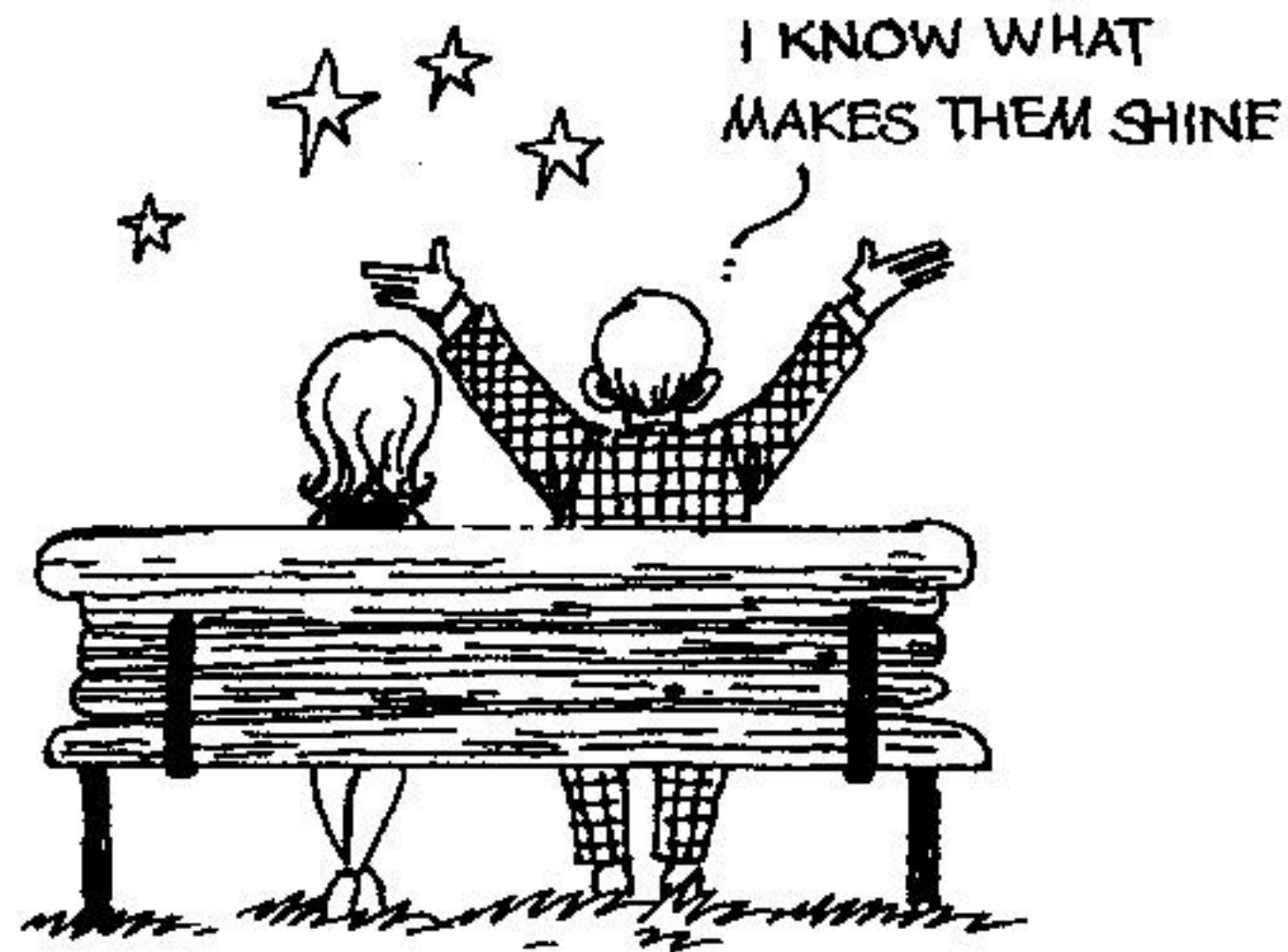
## HOUTERMANS, FRITZ

### *Love and Stars*

**I**n 1929, two physicists Robert Atkinson and Fritz Houtermans (1903-1966) at Gottingen, Germany, forwarded the idea that nuclear reactions are the source of energy of stars. The day Houtermans wrote down the research paper he felt overworked and so went for a stroll with a pretty girl in the evening.

When it became dark and stars looked down upon them in all their splendour. 'Oh, stars! How beautiful!





They shine beautifully, don't they dear?' the girl remarked romantically.

Houtermans could not contain himself. He thrust his chest out and said proudly, 'I've known since yesterday what makes them shine.' The girl might not have understood what he had remarked or its implications in science. Nevertheless, she became Houtermans' wife later.

### *Experiments behind Bars*

**W**hen Fritz Houtermans was put behind bars by the Soviet police on charges of passing on Russian Navy secrets to Nazi Germany, he kept himself busy by working on number theory — 'the only experimental science that you can do without a laboratory!' As he had no paper or pencil, he would scratch numbers on a

piece of soap or on the walls of his cell and in this manner he proved some puzzling theorems!



## **HUMASON, MILTON LA SALLE**

### *An Accidental Miss!*

**C**lyde Tombaugh (1906- ) is today known as the discoverer of Pluto. But another American astronomer at Mount Wilson Observatory, U.S.A., **Milton La Salle Humason** (1891- ), would have discovered this planet a decade before him, had his photographic plate not had a flaw at the very spot the planet was caught in the photograph!



## **JEFFERSON, THOMAS**

### *Stones from Heaven!*

**T**oday, it is commonly known that small and big stony bodies called 'meteorites' fall down from the sky. But in the early nineteenth century, nobody believed this. Several pieces of meteorites, including one weighing two hundred pounds, were found in a small American town Weston in New England by two local college Professors,



Benjamin Silliman and James L. Kingsley. As their colleagues and next door neighbours were sceptical about their claim, they decided to show it to the then American President **Thomas Jefferson** (1743-1826) who was a man of science. When Jefferson saw the stones, he is said to have remarked, 'It is easier to believe that two Yankee professors would lie than that stones would fall from heaven!'



## JENNER, EDWARD

### *No Test, No Honour!*

When the British medical scientist **Edward Jenner** (1749-1823) received world recognition for his discovery of the smallpox vaccine, the College of Physicians in London was keen to elect him as a member. But the condition for the membership was that his knowledge of classical medical science of Hippocrates and Galen should be tested and proved. Jenner refused to undergo the tests, and he was denied the honour!



## JHINGRAN, VISHWA GOPAL

### *Fishy Panchsheel*

**Vishwa Gopal Jhingran** (1919-1991) was India's leading scientist in the study of fisheries. A much honoured and revered scientist, he was a good communicator too. In addition to writing scripts for films, and popular science articles for newspapers and magazines, he also used to give lectures and talks on habitats and habits of fishes to interested people and entrepreneurs. He used to hold them spellbound by using common similes, comparisons, etc.

For instance, he always considered the pond habitat of major Indian carps as a three-tier railway sleeper coach, where 'Catla' occupies the pond surface where sunlight falls, 'Rohu' prefers the middle tier because it is a column feeder, and 'Mrigal' the lower berth as it is a bottom dweller! He often felt that these fishes preferred these habitats to maintain a politically peaceful co-existence — 'panchsheel' as he put it!





## JIVAKA

### *A Unique Convocation*

**T**he ancient Indian physician Jivaka (fifth century B.C.) learnt the basics of medicine for seven years from a well-known physician who resided at Taxila (now near Rawalpindi, Pakistan), the ancient Indian centre of learning. After the completion of his term, the teacher wanted to test Jivaka's practical acumen. He told Jivaka to pick up a spade, go around Taxila for several kilometres in all directions and bring him at least one plant which did not have medicinal value.

After considerable investigation, Jivaka returned empty-handed and reported his failure to his teacher. The teacher was satisfied and issued him a licence to practice medicine!



## JOBS, STEVEN

### *Edison Better than an Indian Sage?*

**S**teven Jobs (1955- ), the American inventor of Apple computer and one of the richest men in the world, was born an orphan! Jobs is his adopted name.

In 1975, Jobs came to India as a hippie in search of a spiritual guru. He travelled to the Himalayas, visited

several ashrams and attended the Kumbha mela. But seeing how people lived without most of the things he



himself was used to, he began to think that an Edison was far more valuable than the entire theory of Marx or the spiritual teachings of an Indian sage!

The turning point in his life came when Jobs and his companion were caught in a flash flood and nearly drowned while walking in a river bed in Madhya Pradesh. He returned to

U.S.A., set up the company that produced the first personal computer in a garage, and has never looked back since!



## KARMAN, THEODORE VON

### *General Anderson, I Presume!*

**T**he American theoretical physicist Theodore von Karman (1881-1963), who had made contributions to supersonic flows and turbulence, could strike a conversation with any man in the street — taxi-drivers, bearers, bar maids, so and so. He also loved and cracked jokes.



Whenever he would meet an Air Force General, he would greet him happily, 'General Anderson, I presume! How are you?'

Often, the General would respond, 'Oh, no! I'm not General Anderson, I am such and such.....'

Von Karman would then say, 'Oh! Is it? I'm sorry!... You see, I know three General Andersons. So, when I meet an Air Force General whose name I've forgotten, I call him General Anderson to maximise the probability!'

### *How to die?*

**T**heodore von Karman never married but had many love affairs and several women friends. Once he said, 'I have decided how I want to die. At the age of eighty-five, I want to be shot at by a jealous husband!'



## KELVIN, LORD

### *The Creation of the First Laboratory*

**W**hen the British physicist and one of the early computer pioneers, Lord Kelvin (1824-1907), joined the Glasgow University as a teacher, he demanded a room where he could conduct experiments. But the university had no room to spare, but a wine cellar! It was allotted to him where he established a modern scientific laboratory — the first in England!

Lord Kelvin was also a great teacher of physics. To make his students interested in the subject, he would blow horns, make soap bubbles, fire gunshots — all sorts of mental and physical gymnastics. It is said he made several discoveries while giving demonstrations to students!

### *Who's Kelvin?*

**T**he Kelvin scale of temperature is named after Lord Kelvin whose real name was William Thomson. Kelvin is the name of the river Kelvin near Glasgow, England. Thomson was made Baron Kelvin of Largs in 1892 for his valuable contributions to thermodynamics and invention of 'tide predictor', an analogue mechanical computer-like device.



## KEPLER, JOHANNES

### *First Authentic Science Fiction!*

**T**he German astronomer Johannes Kepler (1571-1630) renowned for giving the laws describing the elliptical paths of planets around the sun, was also a science fiction writer par excellence. In his novel, *Somnium*,





a man travels to the moon in a dream and describes his journey. For the first time, the portrayal of the moon and its surface was given in a science fiction! And, it was the first authentic science fiction ever written by a scientist!



## KHAYYAM, OMAR

### *More a Poet*

**T**he Persian astronomer and mathematician Omar Khayyam (1050-1123) is known today more for his classic poem *Rubaiyat* than his scientific acumen.



## KIRCHHOFF, GUSTAV

### *Gold from the Sun!*

**W**hen the German physicist Gustav Kirchhoff (1824-1887) discovered in 1860 that by studying the spectrum of the sun, especially what are today called 'Kirchhoff Lines', it was possible to identify elements, including gold, present in the sun, his banker, unimpressed by the discovery, asked, 'What's the use of that gold in the sun which you *cannot* bring down to

earth?' Kirchhoff simply smiled and did not respond, but, when some years later, a British academy honoured him with a medal plated with gold for his discovery, he handed it to his banker and said, 'Here's the gold from the sun!'



## KLEIN, FELIX

### *The Spur to Write*

**E**fforts to popularise mathematics and to provide a glimpse of the latest in mathematics have been made from time to time. In such an effort, the German Professor Felix Klein (1849-1925) of Gottingen intended to bring out an encyclopedia which would summarise mathematical literature at one place. He asked Ludwig Boltzmann (1844-1906) to contribute an article on his own creation 'statistical mechanics'. But a reluctant Boltzmann went on dilly-dallying. However, Klein knew where he was most vulnerable. He told Boltzmann that if he did not write it, he would ask Ernst Zermelo to do the same. Boltzmann immediately accepted the assignment as he knew that Zermelo's opinion on the subject was exactly opposite to his. 'Lest Zermelo's opinion become enshrined in the encyclopedia, I accepted the assignment at once,' he wrote later.





## KOCH, ROBERT

### *Birthday Present Made Him Immortal*

The great German microbe-hunter **Robert Koch** (1843-1910), who traced the origin of several deadly diseases to microbes by means of the microscope, had started using a microscope only when his wife presented him with one on his birthday!



## KOVALEVSKAYA, SOFYA VASILYEVNA

### *Fictitious Marriage*

Russian mathematician, **Sofya Kovalevskaya** (1850-1891) — the first woman to be recognised for her contributions to mathematics — was keen to study mathematics. Those days, girls or women were not allowed entry into classes of higher education in Tsarist Russia. She, therefore, had a 'fictitious' marriage with a publisher of science books, Vladimir Kovalevskaya, in 1868 so that she could travel with her 'husband' abroad and study mathematics in Germany!



## *The Russian Classic*

**Sofya Kovalevskaya** spent her pastime writing a novel about her childhood, *A Russian Childhood*, in 1889, which went on to become a classic in the Russian literature! She wrote another novel, *A Nihilist Girl*, of which the protagonist was modelled after her elder sister. It was banned in Tsarist Russia for its radical views on freedom and rights of women!



## LAGRANGE, JOSEPH-LOUIS

### *The Fatal Plunge*

In 1766, soon after the great Italian-born French mathematician **Joseph-Louis Lagrange** (1736-1813) settled in Berlin as a mathematician in the court of Frederick, he married a young lady from Turin. His French friend and mathematician Jean le Rond D'Alembert (1717-1783) wrote to him: 'I understand that you have taken what we philosophers call the fatal plunge.... A great mathematician should know above all things how to calculate his happiness. I do not doubt then that after having performed this calculation, you found the solution in marriage.' Lagrange replied, 'I don't know whether I calculated ill or well, or rather, I don't believe I calculated at all!'





## LANDAU, LEV DAVIDOVICH

*Beware! ...!*

**T**he Russian physicist and Nobel Laureate Lev Davidovich Landau (1908-1968) — popular as 'Dau' among students — had this notice board outside his office: 'BEWARE! HE BITES!'

*Unique Way of Evaluation*

**L**ev Davidovich Landau rarely read a research paper on physics in detail. He would glance through it anxiously to find out whether it was interesting. If he found it interesting, he would then find out how the author had approached the subject and tackled the research problem. Once understood, he would start doing the calculations himself. If his answers agreed with that of the author, he would approve of the paper!



## LANGMUIR, IRVING

*Research is Fun!*

**S**cientists do research for fun, least of all for money. Willis R. Whitney, who directed research at the General Electric Company, U.S.A., always asked his staff, 'Are you having any fun?' One day Irving Langmuir,

the 1932 Nobel Laureate in chemistry, replied, 'Yes, certainly! But tell me, Dr. Whitney, what am I doing for the GE?'

'That is not your worry!' Whitney retorted.



## LAPLACE, PIERRE-SIMON

*God is a Beautiful Hypothesis!*

**T**he subject of 'Celestial Mechanics' deals with the motion of celestial objects in the sky. It involves considerable mathematics — calculations, geometry, etc — backed with the laws of physics. It also needs considerable deductive logic and reasoning. When the great French mathematician Pierre-Simon Laplace wrote a book on this subject, he forwarded a copy to the reigning Napoleon I.

When the latter browsed through the book, he pointed out that God had not been mentioned anywhere in the book for the motion of the celestial bodies. Laplace replied, 'I had no need of that hypothesis!'

When the other great French mathematician Joseph-Louis Lagrange, who had also contributed to the book, heard this reply, he exclaimed, 'Ah! But it is a beautiful hypothesis just the same! It explains so many things!'





## LAVOISIER, ANTOINE-LAURENT

### *As Eloquent Scientist*

**T**he French chemist **Antoine-Laurent Lavoisier** (1743-1794) was a man of several parts. In addition to science, he contributed to scientific agriculture, finance, economics, government and public education.

He was also a political figure and made several public statements. His most famous statement is: 'Happiness should not be limited to a small number of men; it belongs to all.' He believed that all men had the right to individual liberty.



## LEEUVENHOEK, ANTONIE VAN

### *Maximum Firsts*

**T**he Dutch storekeeper and glass grinder, **Antonie van Leeuwenhoek** (1632-1723), who invented the microscope, has the maximum number of firsts in science. He wrote as many as 375 letters about his scientific discoveries in a span of fifty years to the Royal Society at London, the premier scientific body in those days. For instance, he was the first to see the capillary vessels through which blood travels from veins to

arteries; he gave the first accurate description of bacteria; was the first to see yeast, details of muscle and nerve tissues, protozoa, spermatozoa, and so on.



## LEIBNIZ, GOTTFRIED WILHELM

### *Philosopher Scientist*

**T**he German mathematician, philosopher and computer pioneer **Gottfried Wilhelm Leibniz** (1646-1716) was also known as the 'Aristotle of the seventeenth century' because he touched upon every subject under the sun! When he was not even sixteen, he wrote a treatise on philosophy, whether things exist as individual entities or are perceived in terms of their qualities! Although he carved out — strange enough — a career in politics, he pursued philosophy and mathematics throughout his life. A bachelor throughout his life, he would lock himself up in his room and think of different problems for hours on end!

Unfortunately, at the fag end of his life Leibniz was out of political favour. He, therefore, died largely forgotten by the royalty, politicians and the public. It is said that his personal secretary was the only mourner at his funeral!






## **LEWIS, GILBERT NEWTON**

### *The Most Expensive Cocktail*


**T**he most expensive cocktail was the purified one cubic centimetre of heavy water prepared with great difficulty for the first time by the chemist G.N. Lewis (1875-1946). The first man to taste it was E.O. Lawrence (1901-1958), the nuclear physicist and inventor of cyclotron, who had a fit of apoplexy on consumption. A mouse was another being to drink it but did not have any apparent effect.



## **LOMONOSOV, MIKHAIL VASILYEVICH**

### *Scientist & Grammarian*


**T**he Russian chemist Mikhail Lomonosov (1711-1765), the founder of Russian science, was the first person to observe the atmosphere of Venus and the freezing of the element Mercury. He also wrote a Russian grammar book that transformed the Russian language and went on to found the University of Moscow.



## **LONSDALE, KATHLEEN**

### *Studying Jail and Its Inmates!*

**T**he eminent British chemist Kathleen Lonsdale (1903-1971), who did pioneering work in crystals, was jailed as she refused to do research for the military during the Second World War! However, she took that opportunity to study the jail and its inmates and worked for the amendment of the jail rules and regulations to improve the living conditions there!



## **LYSENKO, TROFIM DENISOVICH**

### *Lysenkoism?*

**I**n the early part of the twentieth century, a Russian plant-breeder T.D. Lysenko (1898-1976), on the basis of his own experiments, managed to convince the Soviet political leader and dictator Joseph Stalin that the entire science of genetics was wrong! He claimed that genes were a myth and environmental conditions had a major role to play in moulding the traits of plants. He went on to impress the Soviet leader that he could increase the food production of the country within a short time provided geneticists like Nikolai Vavilov (1887-1943) and



his supporters were not allowed to interfere in researches conducted in the country. A wave of terror swept among genetists as several prominent scientists like Vavilov who rebelled against him were imprisoned and sent to labour camps in Siberia!

It took the then Soviet regime considerable time to realise that Lysenko's claims were baseless. Finally, he was denounced in 1965. But the damage to genetic research in the former U.S.S.R. had been done. It has since then lagged behind other countries in the field of genetic research.

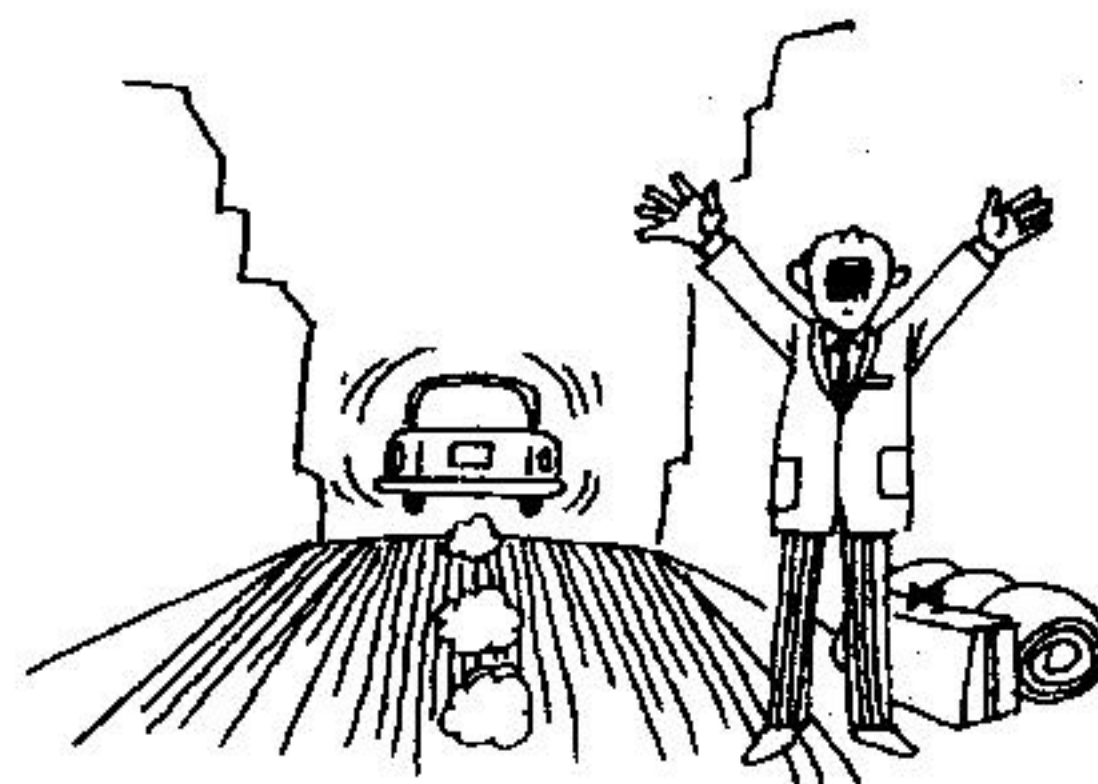
This reign of terror among geneticists is today known as 'Lysenkoism'. It gives a clear message to all politicians and scientists of the world: keep science free from politics and it should be allowed to grow through open debates, discussions and speculations.



## MAHALANOBIS, PRASANTA CHANDRA

### *The Shortest Route!*

**T**he Indian statistician **Prasanta Chandra Mahalanobis** (1893-1972) often had trouble with taxi-drivers, wherever he went, whether it was his home city Calcutta or London. He would often instruct



taxi-drivers to follow the shortest route, leading to differences of opinion, arguments and quarrels with them. On many an occasion, taxi-drivers left him stranded at street corners!

### *Fond of Pets*

**P**rasanta Chandra Mahalanobis was very fond of pets. Even in his letters, he would make mention of their activities. Once he even cried over the death of his pet dog who had passed away in his absence. He said, 'The dog must have looked for me when he was dying!' On another occasion he wrote about his cat, 'Billi, having become mother of so many kittens, is going around with a grave face, as if she is carrying the responsibility of the whole world!'





## **MAXIM, HIRAM PERCY**

### *Motivation behind Slaughter Guns*

**T**he America-born Britisher Hiram Maxim (1840-1916) invented the machine gun in 1887 when he was inspired by a casual remark of an American while visiting Vienna, Austria, 'Hang your chemistry and electricity! If you want to make a pile of money, invent something that will enable these Europeans to cut each other's throats with greater facility!' Although the machine gun went on to slaughter millions of people all over the world, Maxim himself never saw a battle!



## **MAYER, JULIUS ROBERT VON**

### *For Want of Recognition!*

**T**he German physicist Julius Robert von Mayer (1814-1878) is today an unknown name but he was the one who originally came up with the idea of conservation of energy and that the ultimate energy on earth is solar energy. But during his lifetime he was never given the credit for these ideas. In 1848, in despair, he tried to commit suicide by jumping from a window of a three-storey house. In the process, he broke both his legs and

became permanently invalid. He was subsequently sent to a mental asylum. He never recovered fully.



## **MENDEL, GREGOR JOHANN**

### *A Monk and Gardener*

**T**he Austrian scientist Gregor Johann Mendel (1822-1884), who discovered the basic laws of heredity, could not complete his education due to lack of money and had to become a monk for survival. However, the spirit of scientific inquiry was bubbling in him and he began his now world famous experiments on peas in the garden of the monastery. Throughout his life nobody could appreciate his basic laws of heredity nor could they imagine that a monk could conduct scientific experiments. In fact, nobody thought he had done anything other than kept a systematic record of his gardening. His classic work that laid the foundation of genetics was found several years after his death!





## MENDELEYEV, DMITRY IVANOVICH

### *The One and Only Mendeleev!*

The Russian chemist **Dmitry Ivanovich Mendeleev** (1834-1907), the creator of the Periodic Table of Elements, divorced his first wife, Feozva Nikitichna. In



due course, he fell in love with a young artist Anna Ivanovna Popov who consented to marry him despite opposition from her family.

However, according to the church laws of the time, Mendeleev could not marry for seven years after the divorce. But he managed to persuade a priest who agreed to perform the marriage rites for him. Shortly, a noble man who was also keen to remarry was denied permission. He therefore lodged a complaint to the then ruling Czar, claiming that Mendeleev had two wives. The Czar replied, 'Mendeleev has two wives? Okay, fine! But, then, I have only one Mendeleev!'

### *Periodic Table in a Dream!*

Mendeleev sensed the recurring periodicity of elements on 17 February 1869 when he was trying to outline the order in which he wanted to write a book on elements. He wrote down his observations on the

back of an envelope and, after lunch, had a short nap. The idea about the Periodic Table of Elements appeared to him in totality in a dream during the nap! It is now claimed that the idea of the Periodic Table was not new. Several chemists had proposed such an idea in some form or the other before Mendeleev.

### *To a Mother by her Youngest Offspring*

Mendeleev was very much devoted to his mother who had struggled hard to educate him. He dedicated his well-known book, *Solutions*, published in 1887, to her in the following words: 'This investigation is dedicated to the memory of a mother by her youngest offspring. She instructed by example, corrected with love, and in order to devote him to science she left Siberia with him, spending her last resources and strength. When dying she said, "Refrain from illusions, insist on work, and not on words. Patiently search divine and scientific truths." Dmitri Mendeleev regards as sacred, a mother's dying words.'

### *Annual Hair Cut*

Mendeleev had long hair because he got his hair cut only once a year! He never deviated from this practice even when he had an audience with the ruling Czar of Russia.





## MESSIER, CHARLES

### *Immortal Comet Hunter*

**T**he French astronomer Charles Messier (1730-1817) was a big comet hunter, and was equally proud of being so. During his life, he discovered as many as twelve new comets. The then reigning King Louis XV even affectionately called him 'my little comet ferret'. However, he is today renowned not for comets but the vague, nebulous objects that he discovered while searching for comets. Those objects — galaxies, nebulae or a collection of stars — are known today to all night sky-watchers and astronomers as 'Messier Objects'!

### *Ah! To be Robbed of the Thirteenth!*

Charles Messier never thought that he would be remembered for those vague objects which he had discovered during his search for comets. During his lifetime he discovered as many as twelve comets.

But it so happened that Messier could not discover his thirteenth comet when it was sighted as he was



attending to his wife who was on her death bed. Another French amateur astronomer, Jacques Montaigne, discovered it. When Messier's wife died, to a person who offered him his condolences for the grave loss, he responded, with tears in his eyes, 'I had discovered twelve. Alas! To be robbed of the thirteenth by that Montaigne!' When he realised his mistake, he immediately added, 'Ah! that poor woman!'



## MICHELSON, ALBERT ABRAHAM

### *Nobel Measurements and Scandalous Allegations!*

**I**n 1887 — the very year in which the American physicist Albert A. Michelson (1852-1931) showed the absence of ether drift by his ingenious and precise measurements which set the stage for Albert Einstein's theory of relativity, he was caught in a domestic scandal! His housemaid alleged that he had physically assaulted her! She tried to blackmail him into paying some compensation. But when Michelson did not budge, he was dragged into the court of law. In the process, his first wife divorced him! And, Michelson went on to win the 1907 Nobel Prize for his findings.





## MINKOWSKI, RUDOLPH HERMANN

### *Minkowski-proof Instruments*

**T**he German-American astronomer **Rudolph Minkowski** (1895-1976), who studied supernovas and radio sources, had a huge, bear-like appearance, unusual among astronomers. Because of this bear-like strength, he could get an extra turn out of every screw, clamp or guiding eye-piece of a telescope or an instrument! The designers and instrument-makers of the Mount Wilson observatory, where he worked, therefore always ensured that the telescopes or instruments that they designed and built were particularly Minkowski-proof.



## MIKLOUCHO-MACLAY, NIKOLAI

### *Fighting for Freedom and Rights*

**T**he Russian anthropologist **Nikolai Mikloucho-Maclay** (1846-1888), who did pioneering study of the Papua New Guineans, tried to unite these tribesmen to fight against the colonial designs of the British and the Germans! Apart from help improving their standard of life, he wrote long letters in newspapers and met missionaries and the local authorities, arguing their

cases. He even pleaded their cause with the Russian Emperor and placed advertisements in newspapers inviting volunteers to free the Papuans from the yoke of the British Empire. But all his efforts proved fruitless. He was hundred years ahead of time! The Papua New Guinea gained independence only in 1975!



## MOIVRE, ABRAHAM DE

### *Calculated Death!*

**T**he French mathematician **Abraham de Moivre** (1667-1754), best known for his fundamental formula on complex numbers, calculated even the time of his death. When his health started failing, he declared that he would sleep each day fifteen minutes more than the previous day. The day after he slept for twenty-three hours and forty-five minutes, he died!



## MORSE, SAMUEL

### *Whom Art Abandoned, Telegraphy Adopted!*

**T**he real ambition of the now famous inventor of the telegraph and its code, **Samuel Morse** (1791-1872), was to become a world class portrait painter. In fact,



throughout his youth he struggled to become one. His attention was drawn towards wireless telegraphy because he thought he could become rich overnight through its invention. He could thereafter devote his entire life to art!

In 1836, Morse, still struggling to invent wireless telegraph, his painting skills still unrecognised, was forced to stick to telegraphy. Years later, he wrote of painting, 'I did not abandon her, she abandoned me.'



## NERNST, WALTHER

### *Buried Three Times!*

**W**alther Nernst (1864-1941), the great German physicist known for his autocratic personality, was buried thrice — in Gottingen, Berlin and East Prussia! He was first buried in East Prussia! But when it became a part of Russia, his body was shifted to a cemetery in Berlin, and subsequently, to the municipal cemetery in Gottingen where other great German physicists were buried!



## NEUMANN, JOHN VON

### *Brilliant yet Undexterous*

**T**he Hungary-born American mathematician and computer pioneer **John von Neumann** (1903-1957) had a terrific memory. Once he was asked to recite Charles Dickens' *A Tale of Two Cities* which he had read twenty years ago, and he began, 'It was the best of times, it was the worst of times....' After fifteen minutes, those who had gathered around him to listen begged him to stop it! He had memorised all twenty-one volumes of the *Cambridge Ancient History* and the *Cambridge Medieval History*. He could also recite the family trees of the royal families of Europe.

Von Neumann never forgot jokes and could relate them at appropriate times. He was also perhaps the largest human repository of dirty limericks!

However, he was a total idiot in matters technical. He could not change a car-tyre! He was a bad driver. He used to destroy a car a year on the roads of Princeton!

### *The Eccentric Genius*

**J**ohn von Neumann was an eccentric genius. On one hand, he was considered a demi-God among mathematicians. The Hungarian Nobel Laureate Eugene Wigner (1902-1995) once said about him, 'One had the



impression of a perfect instrument whose gears were machined to mesh accurately to a thousandth of an inch.' On the other hand, some others, especially women, felt he was childish in his behaviour, insensitive to feelings, and had no emotional development. He had a fascination for ingenious children's toys, showed boyish enthusiasm for any new gadget, and even played games in a traffic jam!



## NEWCOMB, SIMON

### *A Propounder of Scientific Method*

**T**he Canada-born American astronomer **Simon Newcomb** (1835-1909) wrote extensively on economic matters such as finance, trade, taxation, currency and labour with strong emphasis on the utility of logic, science and mathematics. He went on to write the classic book *Principles of Political Economy*. He always stressed upon the need to utilise scientific method to assess social situations. He analysed even Christianity through scientific method. In short, he was one of the staunch propounders of the 'scientific method'.



## NEWTON, ISAAC

### *Miserable Babyhood*

**T**he great British physicist **Isaac Newton** (1642-1727) was named after his father, who had died three months before his birth! His father was, as one remarked, 'a wild, extravagant and weak man!'

When Newton was born, he was so small and weak that it was thought he would not survive a week! When he was three months old, his mother remarried and he was brought up under the care of his grandfather!



### *The Touch of Lion's Paw*

**A**t the age of fifty-four, **Isaac Newton** suffered a nervous breakdown. After recovery, he was offered the lucrative political post of the Warden of the English Mint.

Everybody thought Newton had accepted the post because he had lost his old touch of science and mathematics. In those days, a little-known mathematician John Bernoulli — not of the Bernoulli theorem fame — publicly posed a mathematical challenge to all the



world's greatest mathematicians. The challenge was to calculate within six months the curve along which a body would fall within the shortest time under given conditions. One afternoon, Newton received a printed copy of the challenge and within the next twenty-four hours he solved it and posted it to Bernoulli without mentioning his name. When Bernoulli read the solution, he recognised the masterly style of Newton and remarked, 'It has the touch of the lion's paw!' It proved beyond doubt to the world that Newton still reigned supreme.

### *Newton and the Lay Populace*

**I**saac Newton's voluminous, scholarly and revolutionary work, *Principia*, is hard to read for a layman even today, not to speak of his times. However, interestingly, his next work, *Observations on the Prophecies*, became very popular amongst the lay populace soon after its release in 1728, the year after his death!

## OHM, GEORG SIMON

### *A Taboo for Experiments?*

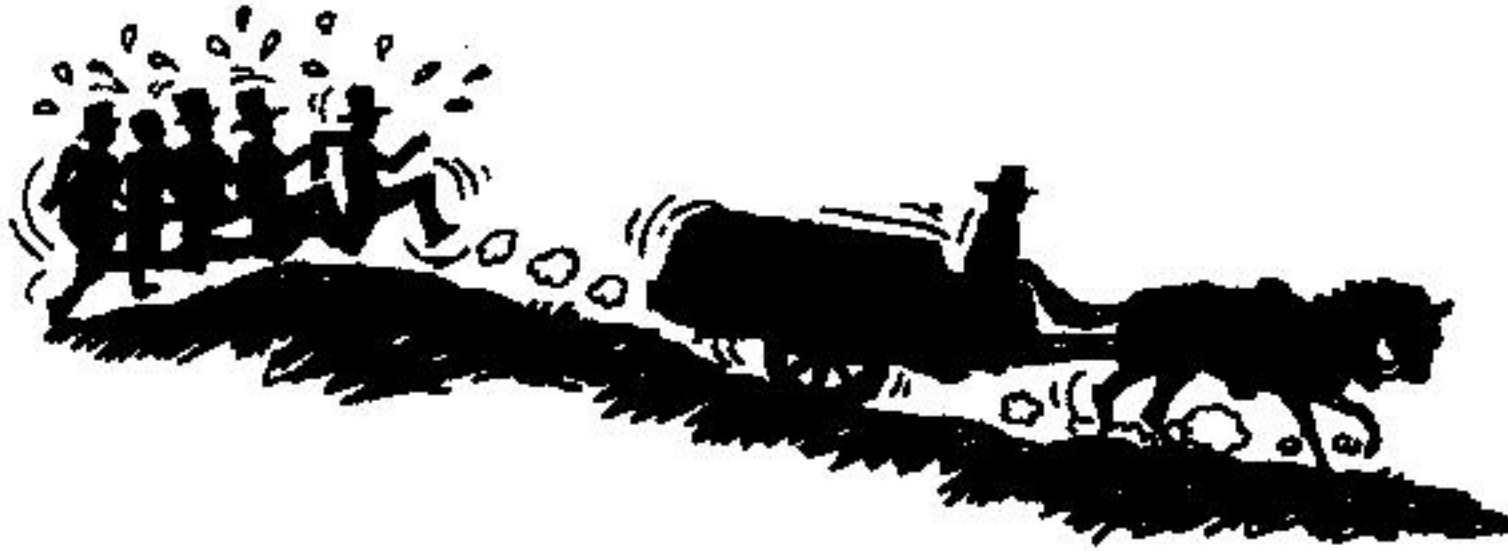
**T**hirty-five year old German physicist Georg Simon Ohm, now renowned for his famous electrical law, who was then working as a low-paid teacher in a Cologne college, was keen to join the local university as a teacher. The requirement for becoming a university teacher was to produce some original work of excellence. Ohm therefore submitted the 250-page treatise *Mathematical Measurements of Electrical Currents* based on his several years of pioneering experiments on electricity. But instead of receiving praise or acclaim, the judges and his colleagues showed disapproval and resentment because he had conducted experiments on electricity. In those days, in Germany (then Bavaria), conducting experiments was considered against the then popular Hegelian school of philosophy. One judge even sent his report to the university with the remark that 'a physicist who professed such heresies was unworthy of teaching physics.' Consequently, Ohm was left with no option but to resign from his teaching post in the college!



## ONNES, HEIKE KAMERLINGH

### *Keeping his Men on their Toes*

**T**he Dutch physicist **Heike Kamerlingh Onnes** (1853-1926), who discovered the phenomenon of superconductivity, was a hard task-master. When alive, he was more respected and feared than loved by his juniors and lab technicians. When he died at the age of seventy-



three in Leiden in 1926, his body was carried on a horse-driven hearse for burial in the churchyard of the nearby village of Voorschoten. The mourners, mostly his colleagues, juniors and laboratory technicians, followed the hearse. As the hearse left Leiden and entered the countryside, it went on a lively pace. Running, panting and sweating, the mourners tried to keep up with the speed of the hearse. They lamented, 'Just like the old man, even when he is dead, he keeps you running!'



## OERSTED, HANS CHRISTIAN

### *The Man He Loved Best*

**T**he world famous writer of charming tales for children, Hans Christian Andersen, wrote a tale 'The Clock' in which he portrayed his fellow countryman and renowned Austrian physicist **Hans Christian Oersted** (1771-1851) as a prince and himself a poor boy. Oersted discovered and established the relationship between electricity and magnetism. About Oersted, Anderson said, 'He was the man I loved best!'



## PAPIN, DENIS

### *Scientific Dinner*

**T**he French physicist and one of the early pioneers of steam engine **Denis Papin** (1647-1712) introduced what he called his 'bone digester,' today popular as 'pressure cooker,' by cooking a dinner in his invention for the guests from the Royal Society, London. The guests enjoyed the 'scientific dinner' without realising the commercial importance of the invention. On the other hand, Papin took it only as a stepping stone to his life-long passion of building a steam engine!





## PARACELSUS

### *What's in a Name!*

**T**he medieval Swiss physician and alchemist **Paracelsus** (his pseudonym) (1493-1541), who laid the foundation of 'iatrochemistry' — consumption of medicines through alchemical processes — was an eccentric, quarrelsome and vainglorious person. His real name was Theophrastus Bombastus von Hohenheim. He adopted the name 'Paracelsus' as his contemporaries were highly impressed by the works of the Roman physician Celsus. He wanted to be a step better than Celsus!

Always quarreling with the medical establishment, Paracelsus wrote several books on medicine in which he even used unbecoming language to vilify his opponents! He believed that a physician should know surgery too. He wrote, 'If you are not a physician, what can you do other than mechanical cutting in tailor's fashion?' At another place he wrote, 'When a physician is not a surgeon, he is an idol that is nothing but a painted monkey!'

Sneering at his contemporary medical teachers, he wrote, 'teachers ... combing lice and scratching. You are not worthy that a dog shall lift his hind leg against you!'



## PASCAL, BLAISE

### *The Child Prodigy*

**T**he French mathematician and physicist **Blaise Pascal** (1623-1662) had developed mathematics and



geometry on his own by the age of twelve! He coined his own terms, like 'bars' for straight lines and 'rounds' for circles, as his father, who was his tutor and who had his own ideas about educating children, would not allow him to

learn mathematics through books!

When once Blaise Pascal had an unbearable toothache, he overcame it by solving a geometrical problem!

At the age of thirty-one, Blaise Pascal had a miraculous escape from death when he was about to be run over by a horse-buggy. It had such an impact on his mind that he devoted the rest of his life to God. He virtually gave up mathematics and





science and turned to religious matters. At the fag end of his short life of thirty-nine years, he wrote the masterpiece *Pensees* on religion which fetched him fame as a literary rather than a scientific figure in France. His literary piece is said to have inspired the great French novelist Voltaire.



## PASTEUR, LOUIS

### *Rather Die than Desecrate!*

In 1885, when Joseph Meister was nine years old, a rabid dog bit him fourteen times. He became infected with rabies, the disease then widespread in France, taking a huge toll on life. Somehow, his case was brought to the notice of the great biologist of the times, **Louis Pasteur** (1822-1895). At that stage, Pasteur had produced the 'vaccine' from the spinal cord of a rabid rabbit and had even tested it successfully on some animals. But not sure of its effects on human beings, he tested the vaccine on young Meister. In due course, Meister recovered, bringing worldwide fame and accolades to Pasteur. A cure for rabies was at last



found! And, Pasteur went on to establish what is now known as Pasteur's Institute at Paris. After his death, he was buried in the chapel of the institute. When Meister grew up he was made caretaker in the Pasteur's Institute.

During the Second World War, the Nazi German forces invaded France and captured Paris. On some suspicion, one of the military officers ordered Meister to open Pasteur's ornately designed crypt. But Meister did not relent. Instead, he committed suicide, preferring death rather than desecrate Pasteur's crypt.



## PAULING, LINUS

### *Earning while Learning!*

The American chemist **Linus Pauling** (1901-1994), who received the Nobel Prize twice, first for chemistry and then for peace used to do menial jobs. He chopped wood for the cooking stoves, cut beef for cooking and mopped kitchen floors to earn money for his college education. He went hungry many a time for want of money.





## PAULI, WOLFGANG

### *A Genius at Twenty!*

The eminent German mathematician Felix Klein was looking for somebody who could write a piece on the newly announced and little understood Theory of Relativity by Albert Einstein for the encyclopedia of mathematical sciences he was editing in the 1920s. He asked a professor of physics at Munich, Arnold Sommerfeld, if he knew somebody who could do this difficult job.

Without a second thought Sommerfeld referred to his own twenty-year-old student who had read Einstein's papers on relativity during dull class room lectures! That young student wrote on relativity, and that piece till today is considered to be the best exposition of the Theory of Relativity.

Do you know who that young student was? **Wolfgang Pauli** (1900-1958), now a well-known name in atomic physics. He went on to win the Nobel Prize in 1945!

### *Arrogance Extraordinary*

**W**olfgang Pauli, a first-rate physicist, was an arrogant and intolerant character.

One day young Pauli met an eminent and senior theoretical physicist, Paul Ehrenfest.

'I like your papers better than you,' said Ehrenfest.

Pauli replied, 'That's strange! Because I like you better than your papers!'

On another occasion, the great Russian physicist Lev Davidovich Landau was put off by a remark made by Pauli on something he had mentioned in his lecture. 'Do you think that all I have said is nonsense?' Landau asked politely.

'Not at all! Not at all! What you have been saying is so confusing that I cannot tell whether it is nonsense or not!' Pauli replied.

### *Pauli Effect*

Do you know what is the 'Pauli effect'?

**Wolfgang Pauli** was a pure theoretical physicist in the sense that all his work was confined to paper and pen. He never did any experiment to check the theories he propounded and ideas he put on paper.

But it was soon discovered





by physicists that in the presence of Pauli any apparatus or equipment was liable to break down without any apparent cause! Thus, word spread all over Europe. Whenever Pauli visited a laboratory, the experimental physicists there used to feel nervous and anxious for their apparatus for fear of the 'Pauli effect'!

### *What Pauli Thought*

Once the Indian physicist and science writer Jagdish Mehra asked Pauli, famous for his acrid tongue, what he thought about his contemporary physicists. About the Father of Atom Bomb, J. Robert Oppenheimer, Pauli said, 'He always acts like the caricature of God in action!' About the German mathematician Hermann Weyl, he said, 'One must first penetrate his façade in order to understand his thoughts.' About the physicist Leon Rosenfeld, he said, 'He is the choirboy of the Pope (Niels Bohr)!'. And about the American physicist Richard Feynman, he said, 'Oh, Feynman! He talks like a gangster!'



## **RAMAN, CHANDRASEKHARA VENKATA**

### *Research Paper at Sixteen*

The eminent Indian physicist and Nobel Laureate C.V. Raman (1888-1970) was hardly sixteen when he got his research paper based on his study of light published in the London-based journal *Philosophical Magazine*!



### *Nobel Prize — Again?*

Once, in 1969, V.T. Srinivasan, the editor of a magazine, visited C.V. Raman in his Raman Research Institute, Bangalore, to present him a copy of his magazine in which his lecture on 'Voice, Speech and Language' had appeared. In return, Raman presented him a copy of his latest book *The Physiology of Vision*. Srinivasan was overjoyed. Tears rolled down his eyes.

'In this book,' said Raman, 'I have blown up the theories relating to the trichromatic hypothesis of colour perception and the duplicity theory of vision. I have also shown that the photo-chemical explanations of the perception of light are also untenable.'

'If so,' asked Srinivasan, 'should not another Nobel Prize be awarded to you?'



Raman became serious and said, 'Well, the discoveries set down in this book are of an epoch-making character. But it may take another twenty years for the Nobel Prize committee to realise that fact! I shall not be alive then!'

### *Nobel Prize for Duping*

Once C.V. Raman had invested Rs 75,000 with a local private banker, who had the nickname 'Financial Wizard.' When the banker went bankrupt, Raman had to forgo Rs 75,000! 'For having duped a Nobel Laureate like me, you should be awarded a Nobel Prize!' he joked when he met the insolvent banker.

### *Madras Turban!*

Before Independence, any Indian who had been abroad was treated as a celebrity and was eagerly listened to for any interesting encounters abroad. When C.V. Raman returned from Europe, a number of friends, relatives and neighbours came to listen to his experiences abroad.

One day when he was thus recounting his experiences abroad, a small boy asked him, 'Did you not find it embarrassing to go around London wearing a Madras turban?'

'Oh, no,' replied Raman, smiling. 'let me tell you about a little incident that occurred when I was in London.' One evening he went to the Royal Institution in London to listen to a lecture by Lord Rutherford. As

the lecture had already started, he quietly slipped into the back row.

Suddenly, Lord Rutherford noticed him and said in the course of the lecture, 'Professor Raman, why are you sitting there all alone in the back row? Come up here in the front row!'

After the lecture, Raman went to Lord Rutherford and asked him, 'How did you recognise me, Professor Rutherford? This is my first visit to London, and never have we met.'

Rutherford smiled and said, 'My dear Professor Raman, I've read your papers and when I saw a person in the audience wearing a Madras turban, I knew it must be you!'

Smiling, Raman asked the little boy, 'So, now you know that there is nothing wrong with a Madras turban.'

### *Getting a Nobel Prize Isn't Easy*

Once, on a short visit to India in 1961, S. Chandrasekhar visited his famous uncle, C.V. Raman, at his Raman Research Institute, Bangalore. The moment he entered the room, Raman was unwrapping Chandrasekhar's new book, *Hydrodynamic and Hydromagnetic Stability*, which had arrived at his desk by air mail just at that moment!

Holding the book, Raman told him sharply, 'The only book of this size I have seen before is a novel by Anthony



Trollope. It was absolute trash!' And he continued, 'How do you manage to write a book of this size? I could never find time to write a book. I always found research far more fascinating. Way back in 1926, I was keen to write a book on the scattering of light. I did not write it because somebody else was writing it. And the result was that he wrote the book, and I discovered the Raman effect and got the Nobel Prize!'

'Oh, my God! Which means I have lost four Nobel Prizes!' said Chandrasekhar sarcastically.

'Getting a Nobel Prize isn't that easy, my dear!' Raman retorted.

### *A Collector of Diamonds*

**C**.V. Raman had a huge collection of diamonds, beetles and butterflies in his museum at Raman Research Institute, Bangalore. He had about six hundred diamonds of different kinds and origins, of which only a few were gifts.

### *Vice-Presidentship*

**O**nce C.V. Raman was sent a feeler offering him the Vice-Presidentship of India! It is said that he had laughed at this and had asked, 'What shall I do with that ship?'

### *Why a Foreign Professor?*

**D**uring the Second World War, when Germany was under Hitler's rule, the great German physicist Max Born (1882-1977) came to stay in India for six months. He came to the Indian Institute of Science, Bangalore, on the invitation of C.V. Raman and he gave lectures and talks on the latest in modern physics. As Born, who hated Hitler, was not keen to return to Germany, Raman thought of making him a professor at the institute so that he would stimulate first-rate physics research in India. But there was immense opposition from his colleagues. In the process, finally Raman had to resign from the directorship of the institute!

*Yes, Sir!*

**C**.V. Raman was fond of talking to himself when he was doing research or conducting an experiment. Obviously, his students or assistants had to comply with a 'yes, sir!.' Sometimes it led to awkward situations.

Once Raman was discussing an experiment with his student A. Jayaraman. 'I say, I am seeing a most remarkable effect in this crystal,' said Raman, looking at the crystal. 'It is absolutely fantastic and marvellous!'

'Yes, Sir,' agreed Jayaraman.

After a few minutes of observing the crystal, Raman continued, 'I think I still see it. It may be there!'



'Yes, Sir,' Jayaraman nodded

A few minutes later, Raman continued, 'I don't think there is any effect. It is all my imagination. I think I was foolish...'

'Yes, Sir!... Oh, no! No, Sir!'



### *Honesty — Best Qualification*

As C.V. Raman had built the Raman Research Institute, in 1949 several applicants were interviewed for the post of scientific assistant. Raman found one applicant, who was found unsuitable for the post, still waiting outside the interview room.

Raman approached him and asked sharply, 'What are you doing here? I told you, we cannot take you in! Why do you linger here?'

'Sir, I know that, but I've come back to return the excess travelling allowance paid to me by mistake by your office....' the applicant stuttered.

'Oh, is it?' said Raman, surprised, keeping his hand on the applicant's shoulder, and taking him to his office. 'Come in, you have been selected for the post! It matters

not if your physics is inadequate. I can teach you that. You're a man of character. That's important to me!'



## **RAMANUJAN, SRINIVASA**

### *Genius Attributed to Goddess*

The Indian mathematician Srinivasa Ramanujan (1887-1920) attributed his mathematical genius to his village-goddess Namakkal. The consort of the lion-god Narasimha, her shrine is about two hundred kilometres from Kumbakonam, the place where Ramanujan was brought up. It is said that before his birth, his maternal grandmother had dreamt that one day Namakkal would speak through her daughter's son!



Young Ramanujan grew up hearing fantastic stories of Namakkal and always sought her blessings. It had such a tremendous impact on his mind, and he would claim that Namakkal wrote equations on his tongue and would give mathematical insights in his dreams!

### *The Book that Stimulated a Genius*

Ramanujan's mathematical genius flourished after reading George S. Carr's book, *A Synopsis of Elementary Results in Pure and Applied Mathematics*.



But there was nothing special about the book or its author! Carr was an ordinary mathematician and the book was a run-of-the-mill mathematics book written with the aim to coach students preparing for some British examinations such as Tripos.

### *Subjects Indigestible*

**R**amanujan had to study subjects like English, physiology, Roman and Greek history and Sanskrit in addition to mathematics when he was studying at



Government College, Kumbhakonam, Tamil Nadu. Physiology especially horrified him because he detested dissections.

Once when his teacher administered chloroform to a frog, he asked him, 'Sir, are the sea-frogs chosen for dissection because we are all well-frogs?'

On another occasion, he wrote the following on digestion in his answer sheet after writing a few sentences about it: 'Sir, this is my indigested product of the Digestion chapter. Please excuse me!'

### *Innocence!*

**W**hile living at Cambridge, Srinivasa Ramanujan knew another Indian mathematician, K. Ananda Rao, who was trying to make a mark in the world of mathematics. Once, Rao told Ramanujan that he was preparing to write an essay on mathematics for the Smith's Prize. Innocent that Ramanujan was, he also decided to compete for the prize. When he approached his mentor and guide in Cambridge, Prof. G.H. Hardy and told him earnestly that he too would like to write a mathematical essay for the Smith's Prize, Prof. Hardy could only laugh at his innocence and humility. He waved him off saying that he (Ramanujan) had already achieved far higher recognition than the Smith's Prize!

### *The Only Photo*

**I**f you have ever seen a photograph of Ramanujan, thank Subrahmanyam Chandrasekhar for that!

It so happened that Ramanujan's Cambridge benefactor Prof. G.H. Hardy was looking for his photograph because he intended to publish a series of



lectures Ramanujan delivered at Harvard University in book form. Hardy was keen to include Ramanujan's photo in it but could not procure one! On his visit to India, Chandrasekhar therefore made it a point to meet Mrs. Ramanujan in Chennai, who somehow managed to fish out an old discrepit passport size photo of the genius from an old trunk! Quite likely, it was the photo specially taken for the passport required for Ramanujan's visit to England! Chandrasekhar made three large enlargements of the photo, gave one back to Mrs. Ramanujan, one to Prof. Hardy and kept one in his own office. Today, it is the only real photo of the genius available in the world! Subsequently, based on that photo, Paul Granlund made a bust of Ramanujan in the U.S.A.



## RAY, P.C.

### *Doctor of Floods!*

**M**ahatma Gandhi often jokingly referred to the revered and sage-like Indian chemist P.C. Ray (1861-1944) as



'Doctor of Flood' because he was always busy with flood relief activities!

### *Science can wait*

**P**.C. Ray lived a simple and frugal life. He wore clothes made of mill-cloth which was later replaced by khadi.



He used to discard clothes only when they had were in tatters. He used to wash his clothes, polish his shoes and ate very sparsely. He never married, and always had two or three students who lived with him. He never spent any money on himself but gave away a lot in charity to various trusts and organisations for the

needy. His contributions and lifestyle earned him the title 'Acharya'.

Although Ray never associated himself with any political party, he could not keep himself away from the freedom movement. He gave a number of fiery speeches at several political platforms. In one speech, he said, 'Science can afford to wait but *Swaraj* cannot!'

### *Small Sums, Big Deeds!*

**I**n 1900, Ray set up the Bengal Chemical and Pharmaceutical Works with a meagre sum of Rs. 800 only! The Indian physicist C.V. Raman discovered what



is today known as the 'Raman Effect' and went on to win the Nobel Prize for physics in 1930 using equipment worth Rs 200 only!



## ROENTGEN, WILHELM CONRAD

### *X-ray Hoaxes*

When the discovery of X-rays by the German physicist **Wilhelm Conrad Roentgen** (1845-1923) was announced in January 1896, it created a stir all over the world. Its purpose was misunderstood and misreported by the press, particularly cartoons. Several curious companies sprang up from nowhere to cash in on the boom.

A London-based company began to manufacture X-ray proof undergarments! A French company laid claim to photograph the soul! A U.S. company claimed to convert small coins into gold using the rays! Even some scientists like Lord Kelvin took X-rays as a hoax!

### *Revealer-rays' Secretive Discoverer*

**Wilhelm Conrad Roentgen**, the famous German discoverer of X-rays which reveal so much about the things through which they pass, was highly secretive about his own researches. Even his research assistants in the laboratory could never find out what he was upto!



## ROSS, RONALD

### *Novelist and Poet*

The Indian-born British medical scientist, Nobel Laureate and discoverer of the malaria parasite,



**Ronald Ross** (1857-1932) was keen to become a novelist and poet during his youth but fate had something else in store for him. His romantic novels were: *Child of Oceans* set in the beautiful island of Andamans and *The Spirit of the Storm* in the West Indies. He also wrote a collection of poems *Philosophies*.

Despite winning the Nobel Prize and saving millions from death, Ross was not satisfied at heart by his profession as a doctor and scientist. Throughout his life he lamented for not having become a novelist!

Ross scribbled the following poetic lines after making the discovery of malaria parasite:

*This day relenting God  
Hath placed within my hand  
A wondrous thing; and God  
Be praised. At his command  
I have found thy secret deeds,  
Oh million murdering death,  
I know this little thing*



*A million men will save —  
Oh death, where is thy sting?  
Thy victory, oh grave?*



## ROWLAND, HENRY AUGUSTUS

### *Greatest American under Oath!*

**D**uring a trial, the American physicist **Henry Augustus Rowland** (1848-1901), who devised a technique for fabricating fine diffraction gratings for the study of stars, was asked who was the greatest American scientist, and he gave his own name! Later, when he was asked how a modest person like him could give his own name, he replied that he said so because he was bound by oath to speak truth!



## RUBBIA, CARLO

### *Big Science and High-flying Heads*

**T**he European Nuclear Research Center (CERN) is a huge scientific organisation in Sweden which conducts research in the field of particle physics. Hundreds of scientists of various nationalities are

employed for the task. But it is extremely difficult in this sea of scientists to talk to one's boss, especially if he is the Director of CERN, who is always flying and is never found in his seat!

Once, a lady physicist was very keen to discuss a physics problem with **Carlo Rubbia** (1934- ), the Italian Director of CERN and a Nobel Prize winner. The latter also understood the importance of the problem and was keen to discuss it with her despite his busy schedule. When she tried desperately to seek an appointment with Rubbia, she could not get one. One day when she had given up hope, her telephone rang and on the line was Rubbia.

'I've exactly twenty minutes to talk to you about your problem,' said Rubbia on phone.

Overjoyed, the woman replaced the receiver, and rushed out to reach Rubbia's room, some distance away. However, when she reached his office, his door was locked. Stunned, she went to his secretary.

'I just now received a call from Rubbia,' said she, annoyed, 'Where's he gone off to — *now*?''

'He's not in! He was speaking from the airport!' exclaimed the secretary. 'He rang me up and told me that he was keen to talk to you about your problem over the phone, but you hung up!'





## RUSH, BENJAMIN

### *Chemistry for Girls*

America's first chemist **Benjamin Rush** (1745-1813) would often give lectures to girls, on the uses of chemistry and its principles starting with what historians call 'humanitarian movement' in America in the late eighteenth century. For instance, he would explain why fire should be extinguished in chimneys, how to remove wine or cherry stains from linen, what material to be chosen for house construction, and how to wash, bleach, and dye clothes. He would even offer chemical tips for preserving female beauty!



## RUTHERFORD, ERNEST

### *The Nuclear Moonshine*

During his lecture to the public in 1938, the eminent nuclear physicist **Ernest Rutherford** (1871-1937) claimed that anybody looking at nuclear reactions with the hope of tapping useful energy from them is expecting 'moonshine'!



## *Within the Limits of Experimental Error!*

Soon after his basic studies, the Russian physicist **Peter Kapitza** (1894-1984) was keen to do research in atomic physics. And in the early part of the twentieth century, the best place to do it was the Cavendish Laboratory at Cambridge, headed by the great physicist **Ernest Rutherford**.

Young Kapitza wrote to Rutherford seeking consent to work under his guidance. The latter replied stating that there was no opening for him at Cavendish. Not disheartened, Kapitza wrote back enquiring about the general rate of occurrence of experimental error in Rutherford's measurements in his lab. Rutherford replied that the experimental error was about ten per cent!

Subsequently, Kapitza wrote to Rutherford that he should be taken as an additional student in his group of thirty students because his inclusion in the group would be within the limits of the experimental error! Impressed, Rutherford immediately agreed to accept him as a research student in his lab!





## SAHA, MEGHNAD

### *Celebrity Classmates*

**T**wo internationally acclaimed Indian physicists, **Meghnad Saha** (1894-1956) and **S.N. Bose** (1894-1974), were classmates both during their B.Sc. and M.Sc. at Presidency College, Calcutta, in the 1910s. In the final degree examinations, Bose came first and Saha second. Both learnt the latest advances in modern physics then taking place in Europe by reading the latest physics books in German, borrowed from an Austrian teacher of botany, Dr. Bruhl, in the Bengal Engineering College, Calcutta. More surprising is that they began to teach these latest advances in physics to students, began to translate the concepts into English, and eventually also made significant contributions to modern physics!

### *Bureaucracy Rules the Roost*

**I**n 1923, much against his wishes, **Meghnad Saha** left Calcutta and joined as professor of physics at Allahabad University. When he visited the university library, he found that it contained only old books, and nothing latest on physics. He, therefore, put a note for purchasing several new books for the library. His note reached the treasurer of the university, who was a former high court judge.

One evening, the treasurer landed up in the library to examine it for himself. He found Saha sitting in the library and reading a book.

Pointing at the books, the treasurer asked Saha, 'Have you read all these books available in the library?'

'No! Nobody can do that!' Saha replied.

Triumphantly, the treasurer asked, 'In that case, why are you asking for grants for making fresh purchases? Better read the books available in the library! After you have finished them ask for money for new books!'

On another occasion, Saha, keen that he was on building a laboratory at Allahabad University, asked for ten 'Post Office boxes' — instruments used in those days for performing some electrical experiments. A bureaucrat without finding out what Post Office boxes were, sent him a note asking him to explain why his laboratory needed so many boxes for receiving mail!

### *Marriage Brought Luck!*

**M**eghnad Saha married Radharani Roy in 1918 when he was hardly twenty-one and still a student. Radharani's father was a well-to-do businessman and offered to give his daughter in marriage to Saha because he was a holder of Premchand Roychand Studentship! But his mother, a grand old lady, was not at all impressed. She asked him, 'Why don't you drown your daughter in the river Padma instead?'



Years later, when Saha was comfortably settled as a professor at Allahabad University after his visit to Europe, he took the grand old lady for a pilgrimage to the holy places of the Hindus — Mathura, Vrindaban and Prayag. Saha then mischievously asked her, 'How's your granddaughter doing now? Is she better than being drowned in the river Padma?' The old lady retorted, 'Radha has brought you luck!'

### *Everything in the Vedas?*

**S**aha once met a lawyer in Dacca (now in Bangladesh). By this time, Saha had already become internationally famous for his contributions to astrophysics. The lawyer became curious to know what exactly were his contributions to science.

That was Saha's favourite subject and he told him in detail about his work on the composition of stars. But the lawyer was not impressed. Every other moment he interrupted Saha to add, 'But, Prof. Saha, this is nothing new. We have all these in the Vedas (the Hindu religious books)!'

Eventually, Saha's fuse blew. He asked, 'Would you please be kind enough to tell me exactly in which parts of the Vedas do we find the thermal ionisation theory of stars?' But the lawyer was unmoved. He continued, 'Well,

I haven't read the Vedas myself but it is my firm conviction that whatever you scientists claim as a new scientific discovery is all contained in the Vedas!'



## **SAKHAROV, ANDREY DMITRIYEVICH**

### *The Russian Gandhi*

**A**ndrey D. Sakharov (1921-1989), the winner of the Nobel Peace Prize and the father of the Russian hydrogen bomb, went on a series of hunger strikes from 1974 to 1985 to attract the authorities' attention to the public denial of justice in the former Soviet Union, and to converge public and world opinion to pressurise the state to rectify them. He, in turn, had to live in exile in Gorki for seven years.



## **SALAM, ABDUS**

### *Teaching Physics in the 1930s*

**T**he Pakistani physicist and Nobel Laureate **Abdus Salam** (1926- ), who made contributions to the study of the unification of the four fundamental forces of nature, namely, gravity, electricity, weak and strong nuclear force, once narrated how he was introduced to



the fundamental forces of nature during his school days at Jhang near Lahore, Pakistan, in the thirties. 'Our teacher,' Salam said, 'spoke of gravitational force. Of course, gravity was well known and Newton's name had penetrated even to a place like Jhang. Our teacher then went on to speak of magnetism. He showed us a magnet. Then he said, "Electricity! Ah, that is a force which does not live in Jhang. It lives only in Lahore, hundred miles east! And the nuclear force? That was a force which lived only in Europe! It did not live in India (or Pakistan) and we were not to worry about it!" But I still remember he was very keen to tell us about one more force — the capillary force. I always wondered why he was so insistent on calling the capillary force "a fundamental force of nature." I think I now know the reason. He was teaching us the force laws according to Avicenna (the eminent Arabic physician). Surely, for a physician, there is no force more important than the one which makes blood rise in the smaller capillaries!'



### *Punished for Breaking Record!*

In 1951, **Abdus Salam** returned home to join the Mathematics Department of Government College, Lahore, after a brief stint at Cambridge. Here he was

ill-treated by the college principal, Sirajuddin. The reason was simple: seven years earlier he had broken the record of Sirajuddin's wife in the B.A. examination, who otherwise came first in all examinations.

In Salam's confidential report, Sirajuddin wrote: 'Salam is not fit for Government College, Lahore. He may be excellent for research but he is not a good college man!'



## **SCHEELE, CARL WILHELM**

### *Marriage on Death Bed!*

The German chemist **Carl Wilhelm Scheele** (1742-1786), the discoverer of oxygen, did not get time to marry. And when he decided to marry at the age of forty-four he was on his death-bed, suffering from gout. Two days after his marriage, he passed away!



## **SCHRÖDINGER, ERWIN**

### *Love is a Great Force*

During his life-time of seventy years, the Austrian physicist and Nobel Laureate **Erwin Schrödinger** (1887-1961) had several love affairs. They inspired him



to write several poems on love and his lovers. Once he remarked, 'All great things in the world are worked through love — not only children. It produces everything. Love is not an impediment to great effort but its carrier.'

Here is a sample of his poetry:



*When on the shore of Wicklow  
after the bathe  
we from each others mouths  
kissed the cherries from each others mouths,  
tell me just what would it mean?  
Is it a pastime for any two?  
When on the shore of Wicklow  
I with my cheek  
'gainst your bare arm leaning  
went asleep against your bare arm leaning  
tell me, just what did it mean?  
Is it a pastime for any two?  
When on some shore of Wicklow  
I'll once embrace you  
with all strength once will embrace you  
what is that going to mean:  
that you thenceforth  
from me shall not go, never go*



## SCHWINGER, JULIAN

### *Ph.D. during Graduation!*

One day the famous nuclear physicist I.I. Rabi was discussing a research paper with his student when he found somebody waiting outside his room. It was the sixteen-year-old **Julian Schwinger** (1918-1994), a first year graduate student at a local college. Schwinger showed him something he had written on a physics problem. Rabi was delighted — rather, impressed — to read what he had written. Schwinger then showed him his college report card which showed that he had failed in several subjects! He told Rabi that the college dean was not ready to admit him for higher classes! When Rabi suggested the dean to offer Schwinger a scholarship for his physics contributions, the dean flatly refused. He even told him that he would not admit him into the next class!

Thereafter, Rabi literally went on a signature campaign for inclusion of Schwinger in the graduate course. He showed Schwinger's paper to several great physicists, including Hans Bethe, who were all impressed and unanimously agreed to recommend him. Schwinger, thus, was allowed admission to the graduate course. By the time he graduated, he had already completed his Ph.D.





**SHANNON, CLAUDE E.***Newton of Information Science*

**T**he house of the American engineer and information scientist **Claude E. Shannon** (1916- ) was full of curious gadgets — from a computer which could play chess to an electronic mouse which could find its way through any maze. No surprise, Shannon is today called the 'Newton of Information Science'!

**SHOCKLEY, WILLIAM***A Controversial Physicist*

**T**he American physicist, Nobel Laureate and inventor of the transistor, **William Shockley** (1910-1989) became a controversial figure in the history of the United States when he openly declared in the late sixties through his lectures and interviews that black Americans were a genetically inferior race and their population needs to be checked by giving them tax incentives! He even went on to urge scientists to study in detail 'dysgenics,' defined as 'retrogressive evolution through the disproportionate reproduction of the genetically disabled.'

His open proclamations made him one of the most despised and vilified men in the United States. He was openly denounced as a pseudoscientist, a fanatic and even a Fascist. His effigies were burnt in various universities and he was even debarred from teaching in some of the prestigious American universities! Few scientists in the world can equal him in this respect.

Curiously enough, Shockley's own invention, the transistor, was used to amplify the shouts, 'Off Pig Shockley!' directed at him at various meetings, demonstrations and protests! Once, when a demonstration was in progress against him, the loudspeaker went out of order. Coolly, Shockley approached the loudspeaker equipment and set it right, to the amazement of the demonstrators!

*The Will to Think*

**T**hroughout his life, **William Shockley** believed in 'the will to think' — a phrase he had picked up from nuclear physicist Enrico Fermi in 1940. 'In these four words,' Shockley wrote later, '... Fermi distilled the essence of a very significant insight: A competent thinker will be reluctant to commit himself to the effort that tedious and precise thinking demands — he will lack "will to think" — unless he has the conviction that something worthwhile will be done with the results of his efforts.' For several years he even taught college



students a course on 'mental tools for scientific thinking' and also wrote an essay 'THINKING about THINKING improves THINKING'!



## **SZILARD, LEO**

### *House! No Need*

**T**he Hungary-born American nuclear physicist Leo Szilard (1898-1964), who initiated and guided the Manhattan Project to build nuclear bombs in the U.S., never owned a house. He lived his entire life in hotels! He once said, 'I have never owned a house, and don't feel the need of owning one'!

### *Clarifying Facts to God!*

**D**uring the Second World War, the Manhattan Project was set up in the United States to build a nuclear bomb to counter the one being built in Nazi Germany. Several contradictory, controversial, misleading and even wrong reports about it appeared in the press. This disturbed Leo Szilard who had initiated the project and played a central role in it. To clarify certain facts, he therefore wrote his own memoirs, *My Version of the Facts*, in the 1940s, and showed them to another eminent nuclear physicist Hans Bethe.

Bethe asked, 'What do you want to do with these memoirs?'

Szilard replied, 'These memoirs are not for publication. I want God to know the facts...'

Bethe asked, 'Don't you think God already knows the facts?'

Szilard countered, 'But He may not know my version!'



## **TAMM, IGOR YEVGENYEVICH**

### *Mathematician among Extremists!*

**W**hen the civil war was on in Russia way back in 1910s, various bands belonging to different ideologies were roaming the countryside trying to cut each other to size. The Russian physicist Igor Tamm (1895-1971), then a young professor of physics at Odessa, visited a neighbouring village to procure some food. While he was looking for some villager who could exchange his silver spoons for chickens, he was caught by a band of Makhnos who were harassing the Red army. He was in due course brought before their bearded chief, the Ataman.

The chief was wearing a tall black fur hat, with machine-gun cartridge ribbons crossed on his broad chest and a few hand grenades hanging from his belt.

Abusing Tamm, the chief shouted at him, 'You Communist scoundrel. Don't you know that the only



punishment for you now is death?'

'But I'm a Professor at Odessa. I've come here to collect food,' replied Tamm.

'Rubbish!' shouted the Chief, disbelieving him, 'Professor? What do you teach?'

'I teach mathematics,' replied Tamm.

'Okay, if you're teaching mathematics,' said the Chief, 'I'll give you a problem of higher mathematics. If you solve it, you are free. Otherwise ——'

And, to the surprise of Tamm, the chief gave a problem of higher mathematics which only a professor of mathematics could know.

Tamm solved the problem at gunpoint, and was freed. Who was the chief? A professor of mathematics? The civil war had brought into its fold all kinds of characters, including professors! Tamm went on to win the 1958 Nobel Prize for explaining the Cerenkov Effect.



## TESLA, NIKOLA

### *Morbid Fears*

The Croatia-born American inventor **Nicola Tesla** (1856-1943), who invented transformers and introduced the A.C. current, had a life-long fear of germs — and as he grew old it became worse! He would wash his hands very frequently! In hotels, he would tell the maids to keep at least eighteen fresh towels ready every day! Besides, he also developed morbid fears. Round objects, even though they may be pearls set in a woman's jewellery, disturbed him! He would prefer to eat things in multiples of three! As this habit caused embarrassment to others, he preferred to eat alone. The last years of his life were spent on the verge of poverty in cheap hotels where he would spend his paltry money on feeding pigeons that came to his window sill!



## THALES

### *Limits of Astronomy*

**Thales** of Miletus (620-555 B.C.) was a Greek philosopher, mathematician and astronomer. He was very fond of observing stars. One night, when he was walking on a street, his mind hooked to a star, he fell into a roadside well! An old woman helped him out. But



when she saw the person was none but the great astronomer Thales, she exclaimed with contempt, 'Here's a man who would study the stars — and *cannot* see what lies at his feet!'



## THOMPSON, BENJAMIN

### *Divorcee Scientist!*

**T**he American-British physicist **Benjamin Thompson** (1753-1814), more popular as Count Rumford, who discovered the first law of thermodynamics and made several inventions, married the sedate, beautiful widow of the great French scientist **Antoine Laurent Lavoisier** (1743-1794) who was guillotined during the French Revolution and divorced her four years later after repeated quarrels!



## THOMSON, JOSEPH JOHN

### *Spawning Nobel Laureates*

**T**he British physicist, Nobel Laureate and the Father of the electron, **J.J. Thomson** (1856-1940) has the unique distinction of being the teacher and guide to as many as eight Nobel Laureates!

## A Novel Reader

**J.J. Thomson** was a voracious reader of novels — almost one novel a night! He was always up to date with the novels of the day and could talk at length about any of them!



## TURING, ALAN

### *Method in Madness*

**T**he British computer genius **Alan Turing** (1912-1954) never bothered about his appearance. He always appeared as though he were just out of bed! His nails were always uncut, his teeth yellow, and his dress sprinkled with ink stains! Often, he used a tie for a belt! His handwriting was shoddy and his attitude carefree! He would talk only to his equals in intellect. He liked to run long distances and preferred to go by bicycle even when he was offered a car ride!



Young Turing always did seemingly 'mad things', but he always had a method in his madness! Once he buried his broken toys so that they would grow like plants! On another occasion, he used a magnet to search for iron filings in roadside gutters! He used to stop at every lamp post to read its serial number! His parents took note of his genius, when, at the age of eight, he located a beehive by observing the flight path of bees and plotting their intersection. However, it was a book, *Natural Wonders Every Child Should Know*, that opened his eyes to science at the age of eleven.

A class topper in mathematics, young Turing had tremendous faith in mathematics. Once when a classmate claimed that he knew mathematics from his previous life, Turing asked him to prove it mathematically!

Turing committed suicide at the age of forty-four when it was alleged in a court of law that he was a homosexual!

### *The Sports Enthusiast*

**A**lan Turing used to walk or cycle for four kilometres every day. In fact, he was a long distance runner and even took part in various athletic meets in his youth. He used to spend two to three hours every day on physical training.



## **VARDHAN, HARSH**

### *To Make Juniors Think*

**I**n 1946, when Dr. Harsh Vardhan joined as a research Assistant to Prof. P.K. Kichlu (1899-1982), an Indian scientist of repute in experimental physics in the Department of Physics, Punjab University, his predecessor Mohinder told him that he had a tough job. Dr. Harsh Vardhan was to assist Prof. Kichlu in installing and operating machines that cut and polished diamonds for various industrial applications. He, therefore, thought Mohinder was referring to the toughness of the job ahead but it turned out to be something altogether different.

Within a few days, Prof. Kichlu met Dr. Harsh Vardhan in the corridor and asked what he was doing. The latter gave some answer about the machines. A few hours later, Prof. Kichlu met him again and again asked him the same question. Dr. Harsh Vardhan gave some vague reply. In the next few days, as and when Prof. Kichlu met him, the same question was posed. Dr. Harsh Vardhan had nothing new to say after every few hours! He could then realise the truth behind Mohinder's comment. Disturbed, he could not sleep at night. After brooding over the problem for long, he thought of trying a new strategy.

Thereafter, as and when Dr. Harsh Vardhan met Prof. Kichlu, he began to ask him questions about diamonds,



diamond technology and machines, etc. The latter took pains to reply and explain. In due course, Prof. Kichlu began to appreciate him. It was the former's technique of making his juniors think, re-think, enquire and re-enquire into their work!

## VAVILOV, NIKOLAI

### *The Master Plant Explorer*

**T**he Russian plant geneticist **Nikolai Vavilov** (1887-1943), who discovered the regions of extreme genetic biodiversities on the earth, now known as 'Vavilov centres', was an intrepid explorer. He escaped miraculously from death several times during his explorations into remote regions for the collection of new plant species. Once a giffon vulture attacked him while he was crossing an overing (a bridge made of twigs and ropes between two cliffs) with his horse, almost toppling him down into the valley below!

On another expedition in Africa, Vavilov's aeroplane force landed in a hot desert due to engine trouble. While the pilot tried to set the engine right, Vavilov kept the hungry, roaring lions at bay with a bonfire of twigs! Once when he was studying late into the night inside a tent, a swarm of scorpions entered it and would have

bitten him to death! But in a jiffy Vavilov realised that it was the light of the lamp that had attracted them. He took the lamp outside, and all the scorpions followed him out!

## VESALIUS, ANDREAS

### *Unsung Until Death*

**T**he Italian **Andreas Vesalius** (1514-1564), who is today called the Father of the Human Anatomy, was never accorded recognition for his contributions and his masterpiece *The Structure of the Human Body* by his contemporaries when he was alive. Even his own teacher Jacobus Sylvius, whom he had once slighted, condemned him and called him an 'unprincipled upstart' and a 'madman whose pestilential teachings were poisoning Europe!' At one stage, when he was offered the chair of teaching anatomy at Padua, Italy, it appeared that Vesalius would be able to propagate his ideas on the human anatomy. But, alas, Vesalius died in a shipwreck during his pilgrimage to Jerusalem before he could return to Italy and occupy the chair!



## WARBURG, OTTO

### *Rotten Man ... Excellent Scientist*

Once a journalist asked **Otto Warburg**, (1883-1970) the German biochemist and Nobel Laureate, his reaction to the allegation that he was an excellent scientist and a rotten human being. In his usual bitter manner, Warburg responded, 'I'm glad it is not the other way around!'

### *No Leave, Please!*

**Otto Warburg** never liked anybody going on leave from his laboratory. He would suggest his staff to do all their miscellaneous jobs on Sundays, whether it was school admission, or attending to a sick family



member or babysitting. When the Federal Government of Germany honoured him with a decoration, he phoned the concerned official: 'Send me the decoration by mail. My experiments allow me no time to leave my laboratory!'



## WATSON, JAMES DEWEY

### *Young Bird-watcher*

**James D. Watson** (1928- ), the American Nobel Laureate and co-discoverer of the helical structure of the DNA molecule, was an avid bird-watcher during his childhood and youth before he came under the sway of molecular biology and genetics. Once he even said that bird-watching 'is a pleasant way to get some science when you're young.'



## WHEELER, JOHN

### *Coining New Names*

The American physicist **John Wheeler** (1911- ), who worked on the hydrogen bomb project, would meditate for a new name for a thing or phenomenon for



hours on end while lying in bed at night or relaxing in a bathtub. But once he was satisfied with the new name he would not tell any one about it but start using it as though everybody already knew it!

In a lecture in December 1967, Wheeler coined the new term 'black hole' for a collapsed or frozen star which was immediately welcomed and adopted by astrophysicists the world over. Today, that astronomical object has even fired the imagination of the public. Even a movie by this name has been produced!



## WHISTON, WILLIAM

### *Potpourri of Astronomy and Religion?*

In 1717, William Whiston, who succeeded the great British physicist Isaac Newton as Lucasian professor, wrote the book with a curious title *Astronomical Principles of Religion*. In the book, he argued the case that God was holding the universe to prevent it from a certain collapse!



## WIENER, NORBERT

### *Alert in Sleep!*

The American mathematician and cybernetics expert Norbert Wiener (1894-1964) was so fond of a mathematical theorem called 'Ergodic theorem' that he would somehow bring it into every conversation, talk or lecture. During a seminar on a specialised mathematics topic at Massachusetts Institute of Technology, U.S.A., a speaker, to his annoyance, noticed that Wiener was fast asleep on his seat and was even snoring! Continuing his lecture, he mischievously added, 'And this has nothing to do with the Ergodic theorem!'

Wiener immediately woke up and said, 'No! No! It does too!' He got up, approached the blackboard and showed to everybody's satisfaction how the Ergodic theorem had to do with what the speaker was talking about!



## ZEL'DOVICH, Y.B

### *'... and so had his staff!'*

The Russian physicist Y.B. Zel'dovich was the Head of the Institute for Physical Problems of the former U.S.S.R. Academy of Sciences in Moscow. He was a



dictator in managing the institute. And, whatever scientific ideas he believed in were supposed to be believed in by his staff!

In 1976 the British mathematician Roger Penrose (1931- ) came to the institute to give a talk. He had earlier decided that he would give the talk on **Stephen Hawking's** ideas on blackholes. However, a day before he was to give the talk he was informed in clear terms that he should not discuss Hawking's ideas in his talk because neither Zel'dovich nor his staff believed in them. Penrose became upset but then he spent the rest of the time to rewrite his lecture. And just an hour before he would enter the hall to deliver the talk he was informed that he could talk on Hawking's ideas as Zel'dovich had changed his mind about it and so had his staff!



## ZWICKY, FRITZ

### *Spherical Bastards*

**T**he Swiss-American astronomer **Fritz Zwicky** (1898-1974), who made important contributions to the study of supernovas and galactic clusters, was considered an irritating buffoon by his astronomer colleagues! He used to think that only he had access to ultimate knowledge and others knew nothing.

For instance, Zwicky would say, 'Only Galileo and I really knew how to use a small telescope!'

He taught a course in physics to which admission was at his pleasure. He would admit a person to his course only if he towed his line of thinking! He was ready to pick up a fight with anybody, often swearing at night assistants, using scientific terms laced with obscenities and violently attacking anybody not agreeing with his ideas in print!

Zwicky would often refer to some of his colleagues as 'spherical bastards'. 'They are spherical,' he would say, 'because they are bastards every way I look at them!'

One particular astronomer colleague, **Walter Baade** (1893-1960), was afraid of Zwicky. He would often whisper to other colleagues that one day Zwicky would murder him ! It was not surprising that anybody should have been mortally afraid of him because he had a glowering flat face, pale blue eyes, and a savage sense of humour.

Disliked and hated when alive, Zwicky is today proclaimed a real genius for his unconventional ideas in astrophysics! For instance, the ideas of neutron star and gravitational lensing were his!

